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1874

TRANSACTIONS

OF THE

AMERICAN

AT THE

ELEVENTH ANNUAL MEETING,

HELD AT WHITE SULPHUR SPRINGS, VA.,

COMMENCING AUGUST THE 1ST, 1871,

BOSTON MEDICAL
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TWELFTH ANNUAL MEETING,

HELD AT NIAGARA FALLS.

COMMENCING AUGUST 6TH, 1872.

CHICAGO:

WABASH STEAM PRINTING HOUSE. COR. WABASH AV. & 12TH ST.

1872.

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TRANSACTIONS

OF THE

American Dental Association,

AT THE

ELEVENTH ANNUAL MEETING,

HELD AT WHITE SULPHUR SPRINGS,

COMMENCING AUGUST 1ST, 1872.

PUBLICATION COMMITTEE.

M. S. DEAN, GEO. H. CUSHING,
ISAIAH FORBES.

DISCUSSIONS REPORTED BY

PROF. T. O. SUMMERS, A.M., M.D.

To the American Dental Association:

In preparing for you the Transactions for the year 1871, your committee has labored under difficulties of no slight magnitude. And if this volume does not meet your expectations in every respect, it is not from the lack of desire nor effort on the part of those who have had its publication in charge.

As is already known to many of you—the conflagration that laid a great portion of the city of Chicago in ashes, consumed, also, the printed volume that was nearly ready to be issued from the publishing house, together with a considerable portion of the manuscripts and stenographic reports. All the lost reports of Standing Committees have, however, been reproduced by their authors; but the reports of discussions will be found somewhat incomplete and disconnected.

The simple statement of these facts will be sufficient to account for some of the defects that may appear in the present volume.

PUBLICATION COMMITTEE.

Chicago, November, 1872.

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MINUTES

OF

TRANSACTIONS.

By M. S. Dean, Secretary

White Sulphur Springs, Greenbrier Co.,
West Virginia, August 1, 1871.

The American Dental Association commenced its Eleventh Annual Session, Tuesday morning, at 11½ o'clock, W. H. Morgan, the President, in the chair.

On roll call, the following permanent members answered to their names:

W. H. Goddard,	Louisville, Ky.
J. Taft,	Cincinnati, O.
Wm. Taft,	Cincinnati, O.
H. A. Smith,	Cincinnati, O.
Geo. W. Keely,	Oxford, O.
I. A. Salmon,	Boston, Mass.
D. S. Dickerman,	Taunton, Mass.
J. H. Smith,	New Haven, Conn.
H. L. Sage,	Bridgeport, Conn.
J. H. Githens,	Philadelphia, Pa.
A. Wert,	Philadelphia, Pa.
J. H. McQuillen,	Philadelphia, Pa.
G. B. McDonneld,	Coneautville, Pa.
Geo. H. Cushing,	Chicago, Ill.
M. S. Dean,	Chicago, Ill.

J. N. Crouse,	Chicago, Ill.
E. R. E. Carpenter,	Chicago, Ill.
H. B. Noble,	Washington, D. C.
R. B. Donaldson,	Washington, D. C.
Homer Judd,	St. Louis, Mo.
J. B. Morrison,	St. Louis, Mo.
W. N. Morrison,	St. Louis, Mo.
Chas. D. Cook,	Brooklyn, N. Y.
W. H. Atkinson,	New York City.
C. E. Francis,	New York City.
M. L. Chaim,	New York City.
E. Floyd,	Fayetteville, N. C.
J. R. Walker,	New Orleans, La.
W. H. Morgan,	Nashville, Tenn.
G. R. Thomas,	Detroit, Mich.

The following absent members sent their dues:

C. F. Wheeler,	Albany, N. Y.
A. Colton,	Hudson, N. Y.
J. G. Ambler,	New York City.
A. L. Northrop,	New York City.
E. A. Bogue,	New York City.
R. W. Varney,	New York City.
E. F. Barnes,	New York City.
W. A. Bronson,	New York City.
Geo. A. Mills,	Brooklyn, N. Y.
C. S. Stockton,	Mt. Holly, N. J.
J. B. Coolidge,	Boston, Mass.
S. W. Dennis,	San Francisco, Cal,
W. W. Allport,	Chicago, Ill.

NEW MEMBERS.

Thos. O. Hills,	Washington, D. C.
O. A. Dailey,	Washington, D. C.
J. J. Birge,	San Francisco, Cal.
Wm. Dutch,	San Francisco, Cal.
M. H. Webb,	Lancaster, Pa.

F. Hickman,	Reading, Pa.
T. J. Richards,	Williamsport, Pa.
Robert Huey,	Philadelphia, Pa.
C. C. Chittenden,	Madison, Wis.
M. S. Jobson,	Perry, Ga.
G. F. S. Wright,	Pomaria, S. C.
J. F. Canine,	Louisville, Ky.
Chas. E. Dunn,	Louisville, Ky.
Judson B. Wood,	Richmond, Va.
Jas. F. Thompson,	Fredericksburg, Va.
C. S. Smith,	Springfield, Ill.
J. I. Taylor,	Cincinnati, O.
G. B. Harriman	Boston, Mass.

On motion of Dr. Cushing, the reading of the minutes of the last annual meeting was dispensed with.

The report of the Committee on Dental Physiology was called for; but, on motion, the regular order of business was suspended, and miscellaneous business taken up.

On motion of Dr. Cushing, Drs. Salmon and Morrison, at their request, were excused from serving on the Committee on Instruments and Appliances, and Drs. J. F. Canine and J. R. Walker appointed by the Chair to fill their place.

Dr. Cushing moved, that if Clinics be held during the session, Thursday forenoon be set apart for that purpose.—Lost.

On motion of Dr. Crouse, the time for holding morning sessions was fixed from 9 to 1½ o'clock, afternoon, from 3½ to 6.

The Executive Committee filled vacancies temporarily as follows:

1*st Division*—Homer Judd, and J. R. Walker.

2*d Division*—Geo. W. Keely, I. A. Salmon, and H. A Smith.

3*d Division*—C. E. Francis.

Adjourned.

FIRST DAY—AFTERNOON SESSION.

Association met pursuant to adjournment. President in the chair.

Minutes of the preceding session read, corrected and approved.

The Report on Credentials was called for. The committee not being ready, the roll was called of those whose credentials had been received and found satisfactory.

[The report which follows was received at a subsequent period in the proceedings, but is inserted here for convenience and uniformity.—*Pub. Com.*]

Your Committee on Credentials would respectfully report the following persons as qualified delegates from their respective Dental Societies:

New Orleans Dental Association—J. R. Walker.
New York Odontological Society—Chas. E. Francis.
Connecticut State Dental Association—H. L. Sage, J. H. Smith.
Missouri Dental College—Homer Judd.
St. Louis Dental Society—W. N. Morrison.
Chicago Dental Society—Geo. H. Cushing, J. N. Crouse, M. S. Dean.
Washington City Dental Society—H. B. Noble, R. B. Donaldson, O. A. Dailey, T. O. Hills.
California State Dental Association—J. J. Birge, Wm. Dutch.
Virginia State Dental Association—Judson B. Wood.
Pennsylvania Association of Dental Surgeons—R. Huey.
State Dental Society of Pennsylvania—G. B. McDonneld, F. Hickman, M. H. Webb, J. H. Githens, A. Wert.
Southern Dental Association—G. F. S. Wright, M. S. Jobson, Jas. F. Thompson.
Illinois State Dental Society—E. R. E. Carpenter, C. Stoddard Smith.
Brooklyn Dental Society—Chas. D. Cook.

Kentucky State Dental Association—W. H. Goddard, C. E. Dunn, J. F. Canine.
Mississippi Valley Dental Association—J. I. Taylor.
Dental Society of the State of Wisconsin—C. C. Chittenden.
Boston Dental College—D. S. Dickerman.
Susquehanna Dental Association—F. J. Richards.
Merrimack Valley Dental Association—G. B. Harriman.
Ohio Dental College Association—J. Taft.
Ohio State Dental Society—G. W. Keely.
Tennessee State Dental Society—W. H. Morgan.
Massachusetts Dental Society—I. A. Salmon.
Cincinnati Dental Society—Wm. Taft.
Mad River Valley Dental Association—H. A. Smith.
Michigan State Dental Association—G. R. Thomas.

GEO. W. KEELY,
I. A. SALMON,
H. A. SMITH,
} COMMITTEE.

The report was received and adopted.

Report on Dental Physiology was called for, and read by Dr. Judd, chairman of that committee. On motion, the report was received and placed in the hands of the Publication Committee.

Discussion followed upon that subject by Drs. Atkinson, Judd, and Taft.

Dr. Walker, on the part of the Committee of Arrangements, gave notice that preparations had been made for clinics to-morrow morning; whereupon, the Chair appointed Drs. Salmon, Carpenter, and Huey as clinical operators.

The following named persons were appointed by the Chair to fill vacancies in Standing Committees:

Dental Physiology—Robert Huey, and J. F. Thompson.
Dental Chemistry—H. A. Smith, M. H. Webb, and G. B. McDonneld.
Operative Dentistry—J. Taft, Wm. Dutch, and C. D. Cook.

Mechanical Dentistry—W. N. Morrison, J. R. Walker, and E. Floyd.

Dental Education—C. E. Francis, H. B. Noble, and F. Hickman.

Dental Histology—H. Judd, and J. H. McQuillen.

Dental Therapeutics—W. H. Atkinson, G. W. Keely, and J. J. Birge.

Prize Essays—J. N. Crouse, J. I. Taylor, and I. A. Salmon.

Adjourned.

SECOND DAY—MORNING SESSION.

Association convened according to adjournment. President in the chair.

Minutes read, corrected and approved.

Report from Executive Committee called for. Further time granted.

Discussion on the subject of Dental Physiology was announced in order, and participated in by Drs. Taft, Browne, McQuillen, Atkinson, Harriman, and Judd.

On motion of Dr. Taft, a volunteer essay was offered. Not being in order at that time, its reading was postponed.

On motion of Dr. Cushing, the subject of Dental Physiology was passed.

On motion of Dr. Taft, a resolution of thanks to Prof. R. K. Browne was unanimously passed.

The Committee on Dental Pathology and Surgery was called. The chairman, Dr. Atkinson, delivered the report.

Adjourned.

SECOND DAY—AFTERNOON SESSION.

Association called to order at the appointed hour. President in the chair.

In the absence of the Secretary, C. S. Smith was appointed Secretary *pro tem.*

Dr. Webb moved a reconsideration of the vote whereby certain dentists, not members of the Association, were invited to take part in the discussions.

Discussed by Drs. McQuillen, Atkinson, Crouse, Taft, and others.

The motion was carried.

On the recurring question, the resolution was amended by striking out all except the general invitation to all persons to be present at the meetings.

On motion of Dr. Taft, the original resolution was expunged from the minutes.

The subject of Dental Pathology was resumed and discussed by Drs. Atkinson and Walker.

While Dr. Atkinson was discussing the medicinal properties of Thymol, Dr. Crouse raised a question of order. The point stated was that the speaker was on the subject of Therapeutics, and not on Pathology and Surgery.

The President decided the speaker not in order.

Dr. Atkinson appealed from the decision of the Chair, and was sustained.

On motion, the subject was passed, and the Report on Dental Histology called for.

Committee not being ready, an essay, entitled "Formation of the Teeth," was read by Dr. Harriman, and discussed by Drs. McQuillen, Atkinson, and Harriman.

Dr. Crouse was added to the list of clinical operators for to-morrow morning.

Dr. Crouse moved that a special session be held to-morrow, commencing at eight o'clock in the evening, for the purpose of selecting the next place of meeting, and the election of officers for the ensuing year.—Carried.

Adjourned.

THIRD DAY—MORNING SESSION.

Association called to order at 10½ o'clock. President in the chair.

Minutes approved.

The subject of Histology (which was considered as opened by the essay on the Formation of the Teeth,) was resumed, and discussed by Drs. Atkinson, Judd, McQuillen, Harriman, and Walker.

On motion, the subject was passed, and that of Dental Chemistry taken up.

The newly-appointed committee having no written report, Dr. H. A. Smith made a few remarks on Nitrous Oxide Gas.

On motion of Dr. Cushing, Mr. M. M. Johnston was invited to explain the character and advantages of liquefied nitrous oxide gas, immediately after the close of the present session.

On motion, the subject of Dental Chemistry was passed.

The rules were suspended for the purpose of bringing up the proposed amendment of Article IV. of the Constitution, offered by Dr. Goddard at the last annual meeting. On vote, the amendment was rejected.

The Association received an invitation to be photographed in a body.

A telegram was received from Thos. L. Kimball, Esq., which read thus: "Will take dentists to next year's convention, Omaha to San Francisco and back for 125 dollars."

The Report on Dental Therapeutics was called for. Dr. Atkinson, the present chairman, read a report written by Dr. Bogue, and followed by an impromptu written report by himself; and, after briefly discussing the subject, the Association adjourned.

THIRD DAY—AFTERNOON SESSION.

Association convened at 4 o'clock. President in the chair.

Minutes read and approved.

The Secretary read a letter from Thos. T. Moore, to the effect that he had been unavoidably detained on his journey to this place, and might not be able to present the Report on Dental Therapeutics which he had prepared.

The subject of Dental Therapeutics was resumed and discussed by Drs. Taft, Judd and Atkinson.

On motion, the subject was passed.

Committee on Operative Dentistry was called, and further time granted.

The Report on Mechanical Dentistry was called for, and further time granted.

The rules were suspended, and a volunteer essay was read by Dr. Dickerman, on the History of Anæsthesia.

A vote of thanks to Dr. Dickerman for his interesting essay was unanimously passed.

The report of the special committee "to prepare a circular upon popular education," etc., was called for. There being no report, and no member of the committee present, the following were appointed a new committee for that object, and the time extended to the next annual session:

S. B. Palmer, of Syracuse; Homer Judd, of St. Louis; and M. S. Dean, of Chicago.

Notice was given by G. R. Thomas to amend the first *Rule of Order* of the Association thus:

"In place of the word 'and' that now occurs between the words '*order*' and '*announce*,' the words '*and after prayer*' shall be inserted."

On motion of Dr. Wert, it was resolved that the morning session be opened by prayer.

Dr. Wert was appointed to invite the Rev. Dr. Hoge, of Richmond, to be present at the opening of the morning session for that purpose.

On motion, the salaries of the Treasurer and Secretary were ordered paid.

On motion of Dr. Walker, a resolution of thanks was voted to the society and trustees of the church occupied by the Association, for their liberality in offering the free use of that building; and that the sum of ten dollars be paid to the officers of the church to repair whatever injuries may have been done. Also that ten dollars be paid to the janitor for his services during the session.

Report of the Corresponding Secretary called for, and read by Dr. Salmon, as follows:

Mr. PRESIDENT:—Your Corresponding Secretary begs leave to report that, in compliance with a vote passed by this Association at Nashville, Tennessee, August 4th, 1870, he has framed and presented the following resolution of thanks to Dr. S. C. Barnum, of New York City:

"In view of the fact that Dr. S. C. Barnum, of New York, has devised and presented to the profession, the most perfect method of protecting cavities against moisture during the operation of filling teeth, and in testimony of the high appreciation of this valuable improvement,

"*Resolved*—That the thanks of the American Dental Association be and hereby are tendered to Dr. S. C. Barnum, of New York City, for the invention, perfection, introduction and donation of the 'Rubber Dam' to the dental profession."

On receipt of which the doctor responds as follows:

"597 5TH AVENUE, NEW YORK,
"Nov. 14th, 1870.

"DR. SALMON:

"DEAR SIR:—Yours, containing resolution of the American Dental Association, is received. Allow me to thank you, and, through you, the Association, and to ask you to express to that

body, at its next meeting, my thanks for the action taken, for the very flattering expression of which I feel not only highly honored but truly grateful.

"Truly yours,

"S. C. BARNUM."

Deeming it to be in accordance with the intention of the Association, in passing said vote, the said resolution was beautifully engrossed, at an expense of $25, as per bill accompanying.

All of which is respectfully submitted.

I. A. SALMON,
Corresponding Secretary.

On vote, the bill was ordered paid, and the report referred to the Publishing Committee.

On motion of Dr. Crouse, Drs. Francis, Goddard, and Smith were appointed Committee on Memorials.

Adjourned.

THIRD DAY—EVENING SESSION.

Association convened at 8½ o'clock. President in the chair.

On motion of Dr. Francis, the reading of the minutes of the preceding session was postponed until to-morrow.

The special order of business for the evening was announced by the Chair to be the selection of the next place of meeting, and the election of officers for the ensuing year.

Dr. Walker moved that absent members be not allowed to vote by proxy. Carried.

The following was offered by Dr. Taft:

"*Resolved*—That the next annual meeting of this Association be held in San Francisco, provided half-fare can be obtained from the principal cities of the United States to San Francisco."

The Chair decided the above resolution inadmissable.

An appeal was taken from this decision, and the Chair was not sustained.

After considerable discussion, the resolution, as thus amended by Dr. Judd, prevailed:

"*Resolved*—That if San Francisco be selected by ballot, it shall be with the understanding that a substitute also be selected, which shall be the place of meeting, provided that one-half-fare rates from the principal cities in the United States cannot be obtained to San Francisco and return."

Upon vote, Niagara Falls was selected as the next place of meeting.

The election of officers resulted as follows:

President—GEO. H. CUSHING, Chicago.
1st Vice-President—C. E. FRANCIS, New York.
2d Vice-President—J. R. WALKER, New Orleans.
Corresponding Secretary—I. A. SALMON, Boston.
Recording Secretary—M. S. DEAN, Chicago.
Treasurer—W. H. GODDARD, Louisville.
Executive Committee—A. B. ROBBINS, Meadville, Pa.; G. B. McDONNELD, Conneautville, Pa.; S. B. PALMER, Syracuse, N.Y.

Adjourned to 9 o'clock to-morrow morning.

FOURTH DAY—MORNING SESSION.

Convened at 9 o'clock. President in the chair.

Session opened by prayer by the Rev. Dr. Moses Hoge, of Richmond, Va.

The minutes were read, corrected and approved.

The Committee on Nominations made the following report, which was subsequently adopted and the committee so constituted:

FOR STANDING COMMITTEES.

Dental Physiology—J. H. McQuillen, M. S. Dean, C. F. Wheeler.

Dental Pathology and Surgery—Homer Judd, W. H. Atkinson, C. Stoddard Smith.

Dental Histology and Microscopy—R. W. Varney, J. Taft, W. W. Allport.

Dental Chemistry—D. S. Dickerman, H. A. Smith, J. J. Birge.

Dental Therapeutics—H. L. Sage, J. R. Walker, W. N. Morrison.

Operative Dentistry—C, E. Francis, E. A. Bogue, Wm. Dutch.

Mechanical Dentistry—I. A. Salmon, F. Hickman, J. H. Smith.

Dental Education—W. H. Morgan, ———

Dental Literature—A. B. Robbins, C. C. Chittenden, J. N. Crouse.

Prize Essays—Geo. A. Mills, E. Floyd, Robert Huey.

Dental Ætiology—W. A. Bronson, L. D. Shepard, G. R. Thomas.

Publication Committee—M. S. Dean, Geo. H. Cushing, Isaiah Forbes.

Dr. Taft moved that the Corresponding Secretary be instructed to notify the members of the Standing Committees of their election within two months from the time of adjournment. Carried.

Dr. Goddard proposed the following amendment to the Constitution, in writing:

"To Amend Art. IV. Constitution.

"The regular meeting of the Association shall be held annually, at such time and place as shall be designated by the Association at its preceding meeting."

Dr. Crouse offered the following:

"*Resolved*—That the Treasurer is hereby instructed to notify each permanent member of his dues, and collect the same as soon as possible, that he may be in funds to honor all drafts drawn upon him."

Dr. Taft moved that a special committee of five members, on Local Societies and for conference with the profession, be appointed by this body. Carried.

Drs. Homer Judd, of St. Louis, J. Taft, of Cincinnati, W. H. Atkinson, of New York, L. D. Shepard, of Boston, and Wm. Dutch, of San Francisco, were subsequently appointed that committee by President Cushing.

On motion, the reading of the Report on Operative Dentistry was postponed, and the Report on Dental Ætiology read by Dr. Taft.

On motion of Dr. Judd, the reading of a few pages of the report was omitted, and the report referred to the Publishing Committee.

The Report on Operative Dentistry was again called for, and Dr. Taft, the chairman of the newly-constituted committee, read the report.

The subject was discussed by Drs. Atkinson, Judd, McQuillen, Taft, Francis, Crouse, Morgan, Dickerman, Dutch, McDonneld, Walker, and Salmon.

On motion of Dr. Crouse, the subject of Operative Dentistry was passed.

Mechanical Dentistry, the next order of business, was taken up, and a report read by Dr. Morrison.

The subject was discussed by Drs. Morrison, Walker, Floyd, and McDonneld.

On motion, the subject of Mechanical Dentistry was passed.

The Committee on Dental Education was called, and a report, written by G. A. Mills, was read by Prof. Atkinson, and referred to the Publication Committee.

An impromptu report was then read by Dr. Francis, the chairman of the newly-appointed committee, upon the same subject.

The subject was briefly discussed by Drs. McQuillen, Atkinson, Walker, and Crouse, and then passed.

Drs. Cushing and Forbes were appointed by the President on the Committee of Publication.

Adjourned.

FOURTH DAY—AFTERNOON SESSION.

Association convened at 3½ o'clock. President in the chair.

Minutes of preceding session read, corrected, and approved.

The special committee, appointed to procure a medal to be presented by the Association to Dr. S. C. Barnum, reported through Dr. Cushing, who placed in the hands of the President a valuable gold medal.

On motion, Dr. Cushing was appointed a committee to present this testimonial to Dr. Barnum.

Dr. Goddard offered the following:

"*Resolved*—That the thanks of this Association are hereby tendered to Drs. Geo. H. Cushing, W. W. Allport, and H. J. McKellops, for procuring and presenting to this Association, the beautiful medal to be presented to Dr. Barnum as a testimonial for the free gift to the profession of the *Rubber Dam.*"

Carried.

Dr. Judd offered the following, which was adopted:

"*Resolved*—That the Publication Committee be instructed to exercise the constitutional right which they are endowed with, of censorship, and to revise and curtail the matter for publication as they may judge proper, to the end that irrelevant matter may be excluded, and the cost of publication thereby lessened."

On motion of Dr. Francis, the President was authorized to appoint a delegate to the next meeting of the Southern Dental Association.

W. H. Morgan was subsequently appointed such delegate by President Cushing.

Dr. Goddard moved to re-consider the vote by which the amendment offered by him last year, relative to time of meeting was rejected. After discussion, the motion to re-consider was carried.

The original motion was verbally amended, the amendment carried, and the resolution as amended then put to vote and lost.

The Report of the Publication Committee was called for, and read by the Chairman.

The following account was approved, and the balance ordered paid.

AMERICAN DENTAL ASSOCIATION TO PUBLICATION COMMITTEE.

Dr. 1870.	To Cash paid Reporter	$80 00
	To Expressage on Transactions	2 40
1871.	To paid bill for Printing Transactions for 1870	204 52
	To Postage, Expressage and Stationery	14 67
		$301 59

Cr. 1870.	By Order paid in favor of T. O. Summers, Esq.	$80 00
1871.	By Order in favor of Dr. J. Taft, for Printing Transactions, 1870	204 52
	By Cash for Sale of Transactions	$13 00
		$297 52
	Balance due Publication Committee	$4 07

M. S. DEAN, CHAIRMAN.

W. H. GODDARD, TREASURER, *in account with* AMERICAN DENTAL ASSOCIATION.

Dr. August, 1870.	To Balance	$59 25
	To Cash, Dues, 1868	10 00
	To " " 1869	75 00
	To " " 1870	555 00
	To " 3 Copies Transactions	3 00
	To " 11 " of M. S. Dean	12 50
		$714 75
Cr. August, 1870.	By Paid Voucher, No. 1	$36 00
	" " No. 2	50 00
	" " No. 3	50 00
	" " No. 4	72 70
	" " No. 5	4 00
	" " No. 6	80 00
	" " No. 7	12 50
	" " No. 8	204 50
	Balance in my hands	205 05
		$714 75

Balance $205 05

Treasurer's Report examined and found correct.

GEORGE W. KEELY,
I. A. SALMON,
H. A. SMITH,
} COMMITTEE.

WHITE SULPHUR SPRINGS, August, 1871.

The Committee appointed to report resolutions expressing the sense of this Association upon the death of Drs. H. E. Peebles, of St. Louis, Mo., and J. G. Willis, of Cincinnati, Ohio, members of this body, presented the following:

Resolved—That this Association hear with deep regret the announcement of the death of Drs. H. E. Peebles and J. G. Willis, both of whom were present with us at our last annual meeting at Nashville, Tenn.

Resolved—That in the death of Dr. H. E. Peebles, the profession has lost one of its most active and efficient members, whose labors in the field of dental education should be recognized by this Association as worthy of commendation; and that, in the death of Dr. J. G. Willis, the profession has lost a member whose ability, energy of character, and devotion to scientific pursuits, gave promise of a brilliant future.

Resolved—That this Association extend to the relatives and friends of the deceased their heartfelt sympathy; but would congratulate them that their sorrows will nevertheless be somewhat alleviated by the reflection that the names of the deceased will long be cherished in grateful remembrance by their professional brethren.

Resolved—That the Secretary be directed to forward to the families of the deceased a copy of these resolutions.

CHARLES E. FRANCIS,
W. H. GODDARD,
H. A. SMITH,
} COMMITTEE.

The report on Dental Literature was called for, and read by Geo. H. Cushing, Chairman of that Committee. It was accepted and placed in the hands of the Publication Committee.

On motion, Dr. Cushing, the President elect, was conducted to the chair by Drs. Cook and Morrison, and installed in office.

A resolution of thanks to the retiring and re-elected officers for the successful discharge of their duties was adopted. Also, a resolution of thanks to the reporters present, and the railroad officials for favors extended, was passed.

The Committee on Prize Essays was called. No report.

A motion was carried instructing those members holding copies of Transactions belonging to the Association to forward them at once to the Treasurer.

The minutes of the day's session were read, corrected and approved.

A committee of ten, consisting of the officers of the Association, were appointed to secure reduced rates of fare to the next meeting.

Adjourned to meet the first Tuesday in August, 1872, at Niagara Falls.

REPORT

ON

DENTAL PHYSIOLOGY.

HOMER JUDD, CHAIRMAN.

The word *Physiology* primarily occupied about the same position that the word *Physics* now occupies, and etymologically signifies the study or the science of nature. But as nearly all words in a living language are subject to changes, in orthography and signification, so this has been restricted in its uses so that it is used now only in connection with the study of living beings. It has, therefore, been defined as the "science of life," and the efforts of physiologists have been principally directed to an elucidation of the vital phenomena. Biology, however, has suddenly arrogated to itself this broader significance, and physiology has now reference more particularly to the organic functions of living beings. If in this restricted sense we have to confine ourselves to dental physiology, we shall have only to consider what is known respecting the function of the dental organs, and our task will have been accomplished. Although this might present many interesting questions for discussion, still it has appeared that there are other questions which have hitherto been less discussed in our Association, and which are at least of no less importance, and which, inasmuch as they lie at the very foundation of all physiological studies, are pertinent to our enquiries. We allude to those questions which pertain particularly to matter and to force. As all functional phenomena are due to the influence exerted by force upon matter, this should evidently be the

point at which our investigations should commence. We must, however, limit our observations at this time to the influence of force upon the matter of living beings. If we would study then the relations between matter and force as here exhibited, we should direct our attention to those conditions when the essential vital phenomena are exhibited in their simplest form. In this way we would be able to separate much from the subject of our enquiries which would tend to obstruct our vision. Should we make our observations only upon the higher classes of animated existences, we might conclude that an intelligent activity was an essential element of life, but if we commence our labors upon more simple forms of life, we shall avoid the danger of arriving at such an erroneous conclusion. Life in the monad is as unmistakable as in the man; and we should gain little or nothing in simplicity if we descend to the beings of the vegetable world. The veriest point of protoplasm exhibits all of the essential characteristics of living beings.

As regards matter, we are at present only interested in it as it is conditioned for the manifestation of vital actions under the influence of force. Matter, therefore, in its relation to life, may be considered in four different forms.

Hitherto we have been accustomed to recognize but three forms of matter in this connection, viz: living, non-living, and dead; but we have found it necessary to add one more, viz: viable, in order that the category may be complete.

By viable matter we mean that which possesses only the potentialities of life; by living, that which manifests the activities; and by non-living, that which is neither endowed with the potentialities nor has ever manifested the activities of life; and by dead matter we mean that which has once lived, but has ceased to manifest the activities, and which no longer possesses the potentialities of viable or living beings.

Should we extend our enquiries and endeavour to explain the physical difference between viable and non-living mat-

ter, we should at once find ourselves upon an unknown sea of speculation which lies beyond the realms of philosophy, with no chart to enlighten, no compass to direct, and no rudder to guide us through the darkness of the unknown depths beyond. Is the potentiality of viable matter conditioned upon a perfection of organization which man can never hope to imitate, or upon the presence of some ethereal form of matter which the chemist's tests have never yet revealed. Dr. Letheby, whilst addressing the students of London Hospital, says: "Why is it that a living cell, as we call it, possesses the power of transforming cosmical forces, light and heat, into cell force, and in aggregating matter, how is it that it keeps common affinities at bay? That when it dies, as we express it, the matter so aggregated during life, decays and comes again within the range of ordinary affinities? What answer can we give to these questions? No other than that organic matter is the designed or appointed medium of these changes; and we can no more explain the phenomena than we can say why it is that mineral matters are the appointed media of other manifestations, as light, heat, magnetism, and electricity. Such questions are beyond the scope of the human intellect, and mark the limit of our understanding." We believe, with Dr. Letheby, that there is a limit beyond which our investigations can never pass. Whilst the activities of life result from secondary causes which may, and probably will, be much more clearly understood, the philosophy of the potentialities of living matter can no more be found out by the investigations of scientists than can that of chemical affinity, which would, if understood, involve a comprehension of the powers, designs, and workings of Omnipotence himself. With these few remarks in reference to matter as related to life, we turn to the consideration of force. The first question which naturally presents itself in this inquiry is:—How many and what forces are known to exist?

Are there a number of physical and vital forces which

are the causes of the different motions or changes in living and non-living matter? We will simply premise that if every mode of motion recognized by physicists as taking place in inorganic matter is due to a separate force, are not all of the various activities found in living beings also due to the influence of an equal number of distinct forces? Would the functions of a force that gives rise to the manifestations of electricity, heat, gravity, &c., be more complex and difficult to conceive of than one which gives rise to the phenomena of growth and reproduction, and at the same time tears down structures already organized, and replaces them with other living structures, and causes all of the multitudinous changes observed in living beings? In a word, if there is a distinct force to correspond with all of these different manifestations, the category must be extended to infinity. If we consider, however, that these different manifestations are due to the influence of force exerted upon matter endowed with different potentialities, and that the potentiality of the matter acted upon determines the kind of manifestation which results, we shall have no use for more than one force to explain the phenomena exhibited. We shall then need no hypothetical vital force to account for those changes in a cell which give rise to growth and reproduction, and which enables it to assimilate foreign material, so that it is endowed with all of the potentialities of living organic matter. These are the only essential processes in living beings. Cells assimilate, grow, and divide, and thus multiply, and this is essentially the only method of multiplication of living beings.

As these wondrous changes are determined by the potentialities of living matter, then philosophy is beyond the reach of human vision.

Man has read upon its rocky pages the world's primeval story. He has traced her changing history in characters inscribed by the hand of Nature, ages before life began.

He has discovered the laws through the operation of which central suns and planetary worlds are evolved from

diffused masses of nebulous matter. He has measured the depths of space, and weighed its mighty orbs, and has determined the very elements of which they are composed, with as much certainty as if they had been subjected to the tests of a chemical analysis. He has tamed the lightnings of heaven, and made them his willing messengers, so that in his communication with his fellow-men, time and space are known no more; but the production of a simple cell endowed with its wondrous powers of assimilation, growth, and reproduction, is as far from being accomplished by human agency now as it was when the cave-dweller was sole lord of the terrestrial creation.

A word in relation to the innovations which we have introduced, and their necessity will perhaps become more apparent.

A grain of corn taken from an Egyptian sarcophagus where it had slept its long sleep of thirty centuries, upon being placed in favorable conditions, exhibited the phenomena of life. The seed was not dead matter, as it proved by its germination, which was also an evidence that it was not non-living matter. It was not living matter, inasmuch as it had not exhibited any of the activities of life during its long state of rest. As it evidently does not belong to the living, non-living, or dead conditions, we assign it a distinct place in our category, and call it viable.

We have asserted above that cells divide and thus multiply, and that this is the only method of multiplication of living beings. We think that any one who will carefully note the processes of all development by division, by endogenous development, and by budding or the pinching off process as it has been called, will agree with us that they are all essentially only divisions of the protoplasmic mass. As to the doctrine relating to the existence of a single or a multiplicity of forces, we would not be understood as claiming the idea as an innovation. If it be conceded that there exists but one force, it will be easy to demonstrate that the different manifestations are due to the potential-

ities of the material substances acted upon. If, for instance, we connect the wires of a galvanic battery in action with a piece of soft iron, the iron becomes a powerful magnet; if however, the connection be made with many other substances no such result follows.

We have confined ourselves to a consideration of these few points, believing that the light shed upon them by the world's great luminaries, warrants a modification of pre-existing views.

DISCUSSIONS.

DENTAL PHYSIOLOGY.

Reported by T. O. Summers, A.M., M.D.

After the reading of the report by Prof. Judd,

Dr. Atkinson said—I regret that I was not present when the first part of that report was read. I congratulate this body that a subject of such importance as this can be considered without any of that humdrum routine that has borne down medical associations. If I were to speak with the mind of a critic, I might say that this is not a report on physiology at all, but upon what is the basis of all physiology. We are now inspirationally after truth. The present difficulty is this everlasting stickling for terms. Now I desire to get at the concept of the speaker, whether he has produced that by the inspiration in himself, or whether it is the product of investigations made by others. He has discussed Matter under four forms. He has referred to the theory of the correlation of forces, which is a new doctrine, and, though new, none the less truthful. The physicist must invade the field of consciousness. He must know that he can think, and then he will know how to think. If we only knew this in our souls, we could then see as we are seen, and know as we are known. We have assumed a miserable duality instead of a glorious unity. We have divided matter and spirit, and then groped our way in darkness and

despair, crying out "we shall never be able to know the truth, and come out into its glorious light!" God forbid that we should so speak. We can get at the beginning of things if we search rightly after truth, and, knowing the beginning, we will then know the relation of things. To talk about the *primal cell*, not knowing what a cell is, is nonsense. It ought to be spelt *s-e-ll*. What does physiology mean? It means *function*, and that means *organ*. There is nothing that is *non-living*. Death itself is nothing but change. Everything comes under the law of homogeneous heterogeneity, and heterogeneous homogenity that pervades the universe of things. The constituents of organs are tissues. Going back to the beginning of these, I do not want to call these germs cells, but bodies. Now there are two ways of cognizing things—by the sentiency and by the senses. All that comes in through the senses is material or physical. That which is cognized by the sentiency, as the science of mathematics and all purely mental labor, belongs to the immaterial. Just here a great battle is raging among the scientists, and this body should consider all these subjects. We come here to work on principles upon which all our practice is based. The great difficulty with us is, that we are not able to differentiate between the two kingdoms, and, until we are, we can never attain to the truth.

Prof. Judd—I desire to make an explanation in relation to the difference which seems to exist between Dr. Atkinson and myself. He believes that there is no essential defference between the *crystal* and the *man*, so far as vitality is concerned. I claim that vital actions are exhibited by living beings, and we call them vital because they are exhibited by living beings, and by them alone. We say that matter is dead, because that is the language which we have agreed to use when it has failed to exhibit the phenomena of life. I believe that the activities of living beings are due to something which operates through the

dead matter. To understand this, I stated, was beyond the limits of our comprehension. If Dr. Atkinson states that we, at some time in the future, shall understand this, he can bring nothing forward to prove it but his own statement. In relation to this term "cell," I will state that I consider the word *body* a better one than *cell*, but cell has been engrafted into our literature and language. We understand little about the growth of language. Words which seemed to be essential to the Latin tongue, and used by Cicero himself, have died out completely. Many words so change their signification by use, that they come to express exactly the opposite of their original meaning. An attempt was made at one time, by the French Academy, to change particular words in the language, and substitute more euphonious ones, but it was utterly useless.

Dr. Atkinson—All that has been said has but proved the inability of words to convey concepts. When it comes to philology, I will discuss that in its proper place. I want to get men out of the place in which I once was. Now, physiology is *function*, that is, *work of a body*. I don't care whether you include it in that skin of a word or not. It is *nutrition*. The idea of a *cell* boggles physiologists. They cannot arrive at the concept of what it is. Why, here is this great skin of ours, with the pabulum careering within it. That's a big cell, itself. The feeding, the function—that's physiology. Until the microscope was discovered, we had not the concept of life. "Hitherto shalt thou come, but no farther; and here shall thy proud waves be stayed—" was written over the doors of Physiology, but the glorious light of the Father above came streaming down through constructive lenses, and multiplied our conceptive powers. Anything that conspires to support functional activity is the basis of physiological action. Anything that don't do this, arrests, deflects, or stops physiological action. It either supports or kills. Will Prof. Judd tell me what is "*killed?*"

Prof. Judd—Loss of its potentiality.

Dr. Atkinson—"*Its?*" What do you mean by "*its?*"

Prof. Judd—Matter that has not only ceased to exhibit the activities of life, but which has lost its potentiality.

Dr. Atkinson—Because it is not perceptible to a dull mind, shall we say that we cannot understand life? We might spend a whole night trying to find out whether a body is frozen or dead, and we would not find out; but the first blush of congestion would reveal it to us. We have not yet risen to the conception that matter must be living to be at all. Plasma is chaos. Physiology is the properly taking in of plasmatic mass that feeds the body. Vitality is simply manifestation. We don't know what life is. We do know what death is. It is change of habitat of ghost. I wish we had some senate or house of bishops to tabulate these concepts. The law of togetherness and apartness is the most primal concept of life. Hence, a crystal belongs as legitimately to the sphere of life as any seraph that blazes before the throne. They have often laughed at my expression "from silex to seraph," "from seraph to silex," but it's true, nevertheless. As we are upon Dental Physiology, we make the assertion that the enamel of the dentine is the only thing that cannot be reproduced. All the rest that have not been given up to the infiltration of the lime salts may be reproduced. The law of ancestral longevity comes in here—the perduring of inherited strength. I know that bone and nerves can be reproduced. This can be demonstrated to stone-fence minds. These tissues can be supplanted, as in the case of tuberculosis, which generates soft bodies in itself, taking the place of the tissues themselves by substitution. I had a case which came under my observation—Prof. Day, of Yale College, who was pronounced consumptive at fifteen years of age. He was elected to the pastorate of a Presbyterian church, but was so feeble he had to go away. He met with a man, who, though called a quack, clearly saw that the pabulum must be supplied on

How a lion?

which the tissues might feed. He took the case in hand, and treated it on this principle:—the supply of pabulum (food), and the tubercles became partly encysted, partly expelled, and the professor recovered, when, at thirty-five years of age, his case was thought to be a hopeless one. Some of you may think me a fit subject for a lunatic asylum because I say a crystal thinks. Thinks about what? you say. About what it wants to take in as necessary to its own existence. Here we have the key that unlocks the whole, and there's not a dog in all the holy mountain to wag his tongue against this eternal truth. I am thankful for that report, and bless God that my good brother Judd has been inspired to that extent. I only wish the angels had brought him up a little higher. However, as we go against the hosts of darkness, let us be careful lest we be found battling against the living God.

Prof. Judd—In relation to this whole matter, I will state that when Dr. Atkinson comes down to facts, we seldom disagree; but as to inspiration, so called, I have found that those of one man teach certain doctrines, while those of another teach diametrically opposite ones, so that I have come to distrust the teachings which claim to be inspirational, and his among them. I think there are times when a man sees things, which, at other times, he could not see. There are times in which a man may be able to express his thoughts more fluently and more clearly than at others. I will concede so much to his inspirational efforts. But when he comes to the upper stratum, there I have to leave him, and I don't think he ought to quarrel with us if we don't believe all his inspirations. I must confess, however, that I seldom find him wrong as to facts. The first thing in the reparative process, undoubtedly, is the exudation of plasma, which becomes organized into a kind of connective tissue.

Dr. Atkinson—When our minds and our affections are married, then we will not quarrel. It is then that we have

the best apprehension. We should integrate into our lives what the great Master taught us—"he that would save his life shall lose it." There is a divinity in Physiology. If it is not there it is Pathology, and then you have his Satanic majesty in shoulder straps. Law is divine. If it's in a rock it's divine.

Prof. Taft—There are present some gentlemen whose views I would be glad to hear on this subject. As they are not just now in the room, I will take a few moments, by way of continuing this subject, until these gentlemen arrive. I was very much pleased with that report, but it did not seem to cover the ground, exactly, which a report on Dental Physiology would seem to indicate. Physiology is the science of the functions of the organs of living bodies—the manifestations of the work of living bodies. This report had reference more particularly to histology—the developmental man. As it seemed to me, the matter of the manifestation of force was not taken up sufficiently. The development and growth of organs is, of course, interesting, but this is not the subject according to the programme. The peculiar manifestation of function is modified by many things. There is a variety even when in a normal condition. All tissues and organs are not alike, even in their normal condition. Some have a greater manifestation of force than others. All these variations are presented by organs, systems and bodies, in their normal conditions. Now, why do they vary? Why are they not the same? Again, there are variations from the normal standard; so we are led to the conclusion that there are no two organisms alike. There is an infinite variety of manifestations, each possessing an identity as peculiar to itself as the faces of individuals, while there are many things in common. Then we have to examine force, and here histology comes in. The examination of peculiar variations, modifications, phases of susceptibility, is necessary. It is a matter of importance to know upon what these depend.

Prof. R. K. Brown, having arrived, and being invited to speak, said—I am glad to appear before this body. I would rather speak before you than before those of my own profession, for you alone, of all men, at once advanced and advancing, listen with receptive minds. The medical profession, though its back-bone has been broken, listens with no receptivity. The literature of Physiology represents no truth. I have studied this in three different languages, and I find but one single statement which represents truth, and that is the circulation of the blood as set forth by Harvey. Thirteen years ago I began the study of microscopy. I then accepted the statements of Kolliker as truth. Six years before I became a physiologist. and did not know but that all the literature upon that subject was true. Very shortly, however, I found many points were erroneous, as for example, that made in reference to the change of the color of the blood. Eleven years ago, I sacrificed all other pursuits, and devoted my whole life to Physiology, day in and day out, without cessation. It was a necessity laid on me, which it was as impossible for me to avert as for a miser to take his affections from the gold he loves. All this time I was studying. And what do I mean by *study?* Do I mean reading words in a book? Do I mean Flint, Bernard, Kolliker, Magendie? No. I mean the observation of functions of the human body, and the substances which perform those functions—that, and that alone consitutes study. Why should I go to books, when I can go to organs and tissues to find out this? I will assert no fact until its truth is established, and I have been led to its full appreciation. I have seen that in the enamel, dentine and bone which would be interesting to you, but I will not utter a deduction until it is fully established as truth, if it takes me ten years to establish it. The bane of the dental profession—a bane without any antidote—as it has ever been of the medical profession, is, that phrases of books are regarded as knowledge. Books had better be discarded from your offices and

from your eye-sight, than be leaned upon as knowledge. There are no books that constitute knowledge. You must know what facts are before you can pick them out. The ordinary reader cannot do this unless he knows more than the author himself. No ordinary reader can pick out a fact from a thousand errors. Books mislead us. Look out for books? I have the material for a book myself, but will not publish it until I know everything I say to be true, by demonstration. Let us take an illustration of the point we are discussing. Take, for example, the statement made in reference to the change in the color of blood. When I began, foolishly, as a metaphysician, I supposed words had a meaning, but I found that they had no meaning, except in the mind of a man. Prof. Huxley uses the same words to express the grossest error, which I can use to express my own convictions of truth. But to come back to the illustration. Change of color in the blood is a phrase, which, as it is used in physiology, does not signify a truth. What constitutes this change? Physiologists have said there are two changes in color. There are no two changes. Magendie said that there were no red globules, but that the blood was a red-hot fluid, and to-day we stand in relation to the color of the blood, exactly where Magendie was, in relation to the red corpuscles. The mere seeing the globules constitutes no knowledge. We have seen them, and know of their existence, but existence is utterly distinct from function. Blood has no color that can be appreciated under the microscope, except as it exists in these little globules. These take oxygen into the system. This is an external agency that enters through these little bodies. But the blood, after coursing through the heart and arteries, becomes purplish again, and physiologists have denominated this a second change of color. It would take one hundred pages to discuss this point fully, and I shall have to be very concise and brief. I assert that there is no second change of color. The fluid of the blood takes no oxygen from the atmos-

phere. This is the precise thing that the solids of the blood do. These impart it to the fluids of the blood, which carry it to organs and tissues. The solid part of the blood does not go to organs and tissues. The function of the solid part of the blood has never been recognized. The solids take up a definite proportion of oxygen, just as it is done in the formation of the chemical compound, chlorate of potash. Blood globules are living matter, not gas. They take up oxygen just as the potash does. The character of the fact of change of color has never been understood. Did carbonic acid make it blue? Carbonic acid has no influence upon it whatever. Dr. Flint will assert to-day that it does. So also Dr. Dalton, who is unequaled as a teacher of error. You laugh. Well, perhaps, instead of being grieved, I ought to feel as you do—derisively—towards these men. There is only one change of color in blood. Now how does it happen that the oxygen does not remain? The theories are numerous on this point. One theory is, that carbonic acid meets the oxygen and pushes it out through the capillaries. Another is the chemical theory of that intolerable chemist, Draper, that the red globules carry the oxygen into the tissues and oxidize them. A second one of his is, that there is an affinity of the tissues for oxygen, by which it is extracted from the globules. The truth is, that the oxygen is delivered to the fluid, which cannot take it directly from the atmosphere. It is suspended in the fluid as the yolk of an egg is suspended in the albumen.. The moment it leaves the globule the blood returns to its original purplish color. No carbonic acid touches it. Now I don't like the fetid carbonic acid which comes from the mouths of your patients, but pure carbonic acid is not only innocent but pleasant. Huxley is full of contradictions. He utters four on one page. He says in one place that asphyxia is due to carbonic acid in the blood. Now, what does asphyxia mean? It means death. He says, subsequently, that he is not satisfied that

carbonic acid is a positive poison, but rather thinks it is a negative poison. Now negative means just *no*thing at all. The one leading truth is to see that the red globules are just what they are. I hope, with your help as a profession, some day to supplant all these old errors. Do you fancy the medical profession will afford any aid? I answer, to use a common phrase, *not much*. You will find, to your astonishment, that those men who stand forth to the world as the greatest discoverers are no discoverers at all. These medical men havn't got the first idea of physiology. Not only are the majority of them ignorant of the truth, but they are also ignorant of the errors that have been advanced as truth. Physiology is but superficially studied by the whole body of the profession. I looked with astonishment at Dr. Halton, a distinguished ophthalmologist, when I found him totally ignorant on all these points. The new microscopy will differ from the old just as error differs from truth. I did not expect to come here until I had started; but while I am here, I will convince you that the physiology of the day is a total mass of error, except Harvey's statement of the circulation of the blood. The fluid of the blood carries the oxygen to the tissues. It can be easily shown precisely what is the relation of oxygen to the cells of the dentine. It is oxidation—that is, departure and supply. I shall deduce facts, from my own observation, which I shall present to your consideration. I am sorry that I have not a thick skin; If I had, I would have contended for the truth among the medical profession. But I am a man of spiritual parts and tender feelings, yet I will not be trampled under the hoof of every ignorant clown.

Dr. Atkinson—I have been one of those who have been persecuting Prof. Browne to get out his book, but I now endorse the slowness of the doctor. Having tasted himself of truth, he could not deal out what he does not know to be truth. We supposed, as all fools do, that we were prepared to differentiate between truth and error, in which

case we would have to know more than the author of the book himself. We must appreciate the difference between facts and truths. Facts are the external manifestations of truth; truth is the substratum. We might all be just now by the side of Prof. Browne if we were only humble enough.

Prof. McQuillen—I have listened with pleasure to the remarks of Prof. Browne, and I was gratified to see the enthusiasm manifested by the Association on the remarks directed against following blindly the authority of books. But if all the brilliant minds that have been laboring before us have only gathered together a mass of error, how dark the past, how unpropitious the future! Brilliant men have lived and died in the pursuit of scientific truth—have given up their whole lives to its attainment; and if we are to regard this only as a mass of error, we are unfortunate indeed. Shall we look with contempt upon the teachings of that mother who starts us on the road to knowledge by giving us word upon word, simply because at some time in the future we may know more than she? She did her best. It is true that those men who go out into undiscovered fields are those who are most likely to commit errors. The great Liebig says, "Show me the man who makes no mistakes, and I will show you a man who does nothing at all." The very fear of making mistakes sometimes leads to error. So apprehensive are some of committing error, that their progress is retarded. When you are so enthusiastic upon the subject of personal investigation, I ask you, are you engaged in it? If there is any one point that I would urge upon the profession, it is that we would use books as the means to an end. Let us make ourselves familiar with books, and then go to nature. I cannot agree that we are bound down by authority, and that all our books should be burned. In relation to the circulation of the blood, it was stated that the red corpuscles were the carriers of oxygen, and that there was no change of color in the blood, but

only a transfer of oxygen. I do not understand any teacher of physiology to assert that oxygen is carried directly to the tissues by the red corpuscles. Nutrition is extravascular.

Prof. Browne—The red corpuscles do not carry oxygen to the tissues, but yield it to the fluid which carries it. The whole question of oxidation is a question of nutrition. Oxygen nutrifies nothing; substance nutrifies. Four years ago I was driven to this conclusion. I know the physiology of three languages, and I have made comments upon them every day, and I do not wish to be misrepresented.

Dr. McQuillen—I do not wish to misrepresent any one. I again repeat that the red corpuscles carry the oxygen in the blood, and it is taken up by the tissues. Do I understand Dr. Browne to say that carbonic acid is not formed in the body?

Dr. Browne—No oxygen combines with any carbon in the process of nutrition. Broken-down tissue—that you learn from the books. When you say that the red corpuscles carry oxygen to the tissues, you state what the books say, but it is contrary to fact. By endless citation of facts I can prove the physiology of the day contains but one truth. But it is like charging the Roman Hierarchy with falsehood to say so. It means persecution and death for heresy.

Dr. McQuillen—The simple *assertion* that fact is fact, is not a demonstration. Men of science want proof. To deny that there is a union taking place between the carbon and oxygen in the blood demands more than mere assertion. Chemists assert that there is carbonic acid present in the blood, and the proof is simple. This is seen by breathing into lime water—carbonate of lime being precipitated. Now where does it come from? How do we know that it does not impart color? Certain elements in the dark may remain in close proximity to one another without any action upon each other. But let a ray of light come in,

and they unite with explosive energy. Is it asserted that carbonic acid, not having color, cannot impart color? Carbon is found pure in that priceless glittering gem, the diamond, and then it is found as charcoal, black as night. Now if there is no difference in these substances chemically, is it not reasonable to infer that carbonic acid, though colorless under one condition, may, under other conditions, impart color to the blood? There is no man for whose efforts I have a higher esteem, so far as they tend towards the advancement of truth, than those of Dr. Browne, but I am not one of the men to cry "yes, yes" to one thing to-day, and "yes, yes" to another thing, to-morrow, which is exactly the opposite. Let me endeavor to impress you with the proper regard for authorities. Do not be borne down by books, all of which may contain mistakes, but, I beg of you, do not regard as ignoramuses all the men of brilliant minds that have labored before us, else how dark and blank will be our future.

Dr. Harriman—While it is our duty to respect the brilliant minds of which the doctor speaks, yet we must examine for ourselves. Science is not stationary. We must cull over their works, which, in their day and with their appliances, were to them apparently correct. Prof. Browne has been my teacher; I have assisted him in his demonstrations on living animals, and I assert that it is not a mere fancy. I know it to be true. He speaks from experience. He has worked himself nearly to death, and no one appreciates him. He is greatly to be pitied; but yet he has the consciousness of doing something to advance the science of his day. When he publishes his work it will be a new dispensation. The examinations of the chemist are of little worth. What is it that he examines? Everything he touches he kills, and it is then dead organic matter and not living tissue. I respect chemistry as a science, but I have seen the falsity of its deductions as plain as I see the President in the chair. If you will investigate for

yourselves, you'll find them to be so. The improvements made in microscopes have almost entirely set aside the testimony of the fathers.

Dr. McQuillen—The gentleman informs us that he has enjoyed peculiar advantages over the rest of us, in the investigations he has made. Now I dislike to speak about myself, but the gentleman's remarks have forced it upon me. Some two or three years ago I worked upon this subject (physiology of the blood) almost incessantly, experimenting with dogs, cats, rabbits, etc., and would not be understood as speaking wholly from books. The results of these experiments were republished in the leading journals of England and Germany. I respect a truth on the printed page, and I will receive it from any source, yes, though it be from an ignoramus himself; and I do it, too, without any fear of crucifixion. I am utterly relieved of all apprehensions on that score. Truth will live, and why foist it in a miserable individuality?

Dr. Atkinson—It is a rule in all investigations that the *onus probandi* lies upon him who makes an assertion. Truth is not negative.

Prof. Judd—The principle stated by Dr. Atkinson is correct, but it is not always recognized. I have but a few remarks to make, and may travel over pretty much the same ground as that covered by Dr. McQuillen. In relation to books upon physiology, Dr. Browne said that there was but one statement in them all worthy of credence, and that was the circulation of the blood as demonstrated by Harvey. We are well aware of the enthusiasm which fills the minds of men engaged in the work of discovery. In their investigations they are apt to lay aside circumstances. Now, does the gentleman mean to say that the stomach is not concerned in the process of digestion, and that the kidneys do not secrete urine? Now, I recognize the gentleman's efforts, but he is not the only man who has spent his life in the pursuit of science. He tells you that words have no signifi-

cation except in the mind of a man. There is an acquired signification of words recognized by the best writers and speakers. I do not assert that that there is an inherent signification in words. I believe I understand the gentleman to say that there was but one change in the color of the blood, the change from purple to scarlet. There is an admitted change from purple to scarlet. Now I want to know how it came to be purple again. I can understand something of the gentleman's aversion to the medical profession. It has not appreciated him; but it was its fault, not his. There is a strong tendency at the present day to test all new theories, and when he has fully demonstrated his, he will get full credit from the medical profession for all that he has done. The next gentleman (Dr. Harriman) assured us that Dr. Browne had labored faithfully, and he moreover declared that the doctrine advanced is true; and now we have it endorsed by the whole weight of that gentleman's authority. There seems to be two ways of looking at these things. We may be conscious of knowledge which we cannot impart. You may be subjectively conscious of your own existence, but that is not objective evidence to me. Subjective evidence to me is not objective evidence to you.

Dr. Harriman—The stomach does not digest the food; it only contains it. The gastric juices digest the food, assisted by the secretions of the salivary glands. As to white corpuscles passing through the walls of the capillaries, I have never seen them do so, but perhaps the speaker has. But I have seen cells proliferating and producing cells. I know this, because I have seen it, as many of you doubtless have done.

REPORT

ON

PATHOLOGY & SURGERY.

W. H. ATKINSON, CHAIRMAN.

There are two questions to be definitely understood, defined and proved, before any settled basis can be laid by which to test either the principles or practices that may be propounded or proposed in pathology and surgery.

These two questions are, first, What is Pathology? Second, What is Surgery?

When these shall have been disposed of, we shall have the basis by which to determine conditions and indicate procedures.

Have we attained any such basis of apprehension of principle and process?

An affirmative reply cannot now honestly be given;

A negative reply must be a qualified one:

For we are in possession of much that is affirmative, but also much that is yet incomplete and therefore still negative.

Reports of cases proceed upon some assumed basis of principles supposed to underlie and point out the legitimate procedure to understand and manage them:

Hence reports of cases are always less instructive than the cases themselves.

The impossibility of having the cases before the assembled wisdom and strength of our body at its convocations, compels us to do what we may with reports, or forego the

instruction they afford, incomplete though it be, still of value.

As soon as any case of pathological action is completely understood, we shall be in possession of the knowledge that will enable us to avoid, arrest or annihilate it, by obeying the laws under the infraction of which it was propagated!

Any body or process that has an origin must have an end.

The primal bodies denominated corpuscles have an origin, longevity and death or disappearance, that when definitely observed and known will advise us of the amount of work that any tissue can safely be made to perform. It has long been known that the different members of classes of animals have a like longevity and original strength:

Also—that the stored-up fat was capable of being resolved into pabulum of hybernating animals:

And that dogs of the chase could endure consecutive days of continued pursuit of game without feeding:

And that when the excitement was over and they returned to their kennels, they refuse food for a greater or less length of time, according to their fatness or leanness at the start.

But why they went into a moribund state of repose has never been explained.

Is it not because of the metamorphosis of stored-up fat having been begun by the high temperature induced by the prolonged chase, had to be completed by being converted into pabulum again, upon which the animal subsisted during his torpid state?

It is well known how voraciously they eat after this term of torpidity has passed,—also how thin and limber, lithe and strong they are at the end of the term of hybernation or torpidity, and how stiff, stark and weak they are if aroused before the termination of this period.

In case they are induced to feed before they are over the slumbrous stage, they are made sick or rheumatic, gouty, tuberculous or other form of condition that indicates the unreadiness of the tissues to appropiate pabulum prepared

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from the food administered, with that already in reach of the tissues, the resultant of the broken-up fat corpuscles.

Just here the field of the nutrient function opens out to our view with such winning grace as to cause us to desire to have a whole month at our disposal, instead of the short space allotted to a fractional mention of the mere alphabet of the metamorphic process of nutrition!

What the physical changes really are in minutia of detail, is but beginning to attract the attention of a few earnest searchers after the laws and processes of producing and sustaining the machinery by which function is produced, elaborated and maintained.

The enlargements and contractions of the corpuscles, cells and vessels of the histological territories in which the actions of reception, integration and disintegration of pabulum or of *con*struction and *de*struction take place, must come within our mental grasp before we can possibly understand the duration and extent of any of these in physiological or pathological processes.

This stage of physiological rest so rigidly required by the laws of metamorphosis in tissues, to fit them for normal work, has not been sufficiently heeded, where apprehended, and seldom apprehended where encountered, by physician or surgeon, as it really is in every case of lesion of function or factor of function,

In the amphibia, frogs especially, are examples of the fat cells containing free oleagenous pabulum in the spring, at the end of the winter torpidity.

These cells are more abundant and distinctly observable at the outlets of the alvine and procreative canals.

This points to the lowness of temperature that batrachians are able to endure, and to the probability of the necessity of complete metamorphosis of fat into pabulum after it has once been set up in the cellular receptacles.

Food must be abundant, and quiet secured, to accumulate fat in large quantity.

The great endurance of cold evinced by fat men, and

also their aversion to heat, and inability to exert themselves in hot weather, point in the same direction.

The best possible treatment of surgical cases occurring in fat subjects is to initiate hybernation, and cut off all supplies of food, and institute forced physiological rest, if need be, to attain the requisite quiet—quiet and coolness being equivalent terms.

As all supply of nutriment to the elements of tissues must be in a fluid condition, and all reproductions of these elements must also arise in fluids, it is plain that the granules and corpuscles of the pabulum and circulation must flow in a medium with the requisite freedom to be able to pass into the locality where they are needed to sustain or rebuild the wasted or broken tissues.

These seed-bodies of tissues are granules and corpuscles, corpuscles being masses of germinal matter of more or less regularity of form, globular, ovoid, spindle-shaped, and filamentous albuminoid pulps.

And these are the precise characteristics of body to favor easy and rapid thermal change, and thus help to accelerate, retard or arrest the movements that constitute the formation and nutrition of the soft and hard tissues that construct the various tissues and organs of the system, and give the measure of its perfection and endurance.

Pulp is from *pulpa*, a latin word, meaning the calloid, gelatinous, albuminoid soft part of animal flesh; also the fleshy parts of fruits.

In the sense of a soft-solid body, it is very significant, and well worthy of deep and searching study, as in this state it holds the elemental prophesy and proof of all planetary existences throughout its own range, which is that of corpusculosophy no less than that of cell-life or cellosophy, and the mineral kingdom, or crystallosophy.

As an amoeba or pulmograde monad, it is the wonder of naturalists to this hour, and the embodiment, as just hinted, of the possibilities of morphology in the animal world.

As the indifferenced representation of the three essentials

of animal existence, in respiration, innervation, and circulation, it is the initial letter of the alphabet of function; and as function is the work of body, in unified diversity and diversified unity, in all simple and composite presentments of body; and as physiology is normal function, and pathology divergent functional activity, the synthetic analysis and the analytical synthesis of *body* and *work* seem to be the pretty little task required on this occasion for our entertainment, illumination or apathy, as each may be disposed to regard it.

To *talk* of a body suggests origin, purpose, destiny.

Hence, to *talk* of origin involves *thinking* of origin; and, as we must be, before we can become conscious of existence; and as we only become conscious of doing any act of our lives by doing it; and as, when any act is performed, it cannot be undone; is it not well for us to take heed how we think, that we may avoid the folly of calling progress by the false name of "a repetition of identical acts," as the past so lamentably have done in the attempt to copy leaders and their assumptions?

The dissatisfaction just expressed, has been felt by every one who has assumed the responsibilities of surgical practice.

And it has been more than hinted that it is ridiculously impudent to question the dogmas of the text-books and those who happen to occupy (not fill) the positions of teachers in the reputedly best institutions of learning.

Is it not, rather, the veriest malpractice to attempt to follow directions not understood, and principles not comprehended, and then mumble cabalistic jargon in extenuation of the wretched attempt to be somebody else than our proper selves in the works of mind and body, as the sticklers for "written," "established," "book authority," constantly do.?

If, then, the most advanced are but abecedarians in the understanding of a completed philosophy of pathology and surgery, what shall be said of those who are yet unable to discern the signs that constitute its alphabet?

To all, we would most affectionately say—to avoid being swamped, you had better study "*things*," not "*books*."

And in the absence of the thing itself, study its representatives in nearest relation to it, as follows:

1. The thing. 2. Its bust. 3. Its portrait. 4. Its description. 5. Its name.

It is apparent that the bust must be made by an observer, and can only represent the thing in a single aspect, and that a statical one, and hence, the knowledge of the thing thus attained is very incomplete.

The bust presents the external aspect on all sides.

The portrait presents the external aspect of the thing, but on one side only.

The description can give but verbal or worded aspects of all sides, internal and external.

The name, a single verbal aspect, that, without description, portrait, or bust, must be vague indeed and nearly useless.

Surgery is the means made use of to restore lesion of tissues; in other words, the "handwork" requisite to the preservation or restoration of invaded tissues or organs.

Surgery, then, does not produce tissues and organs, only supplies the conditions under which the organic forces may elaborate and perfect these tissues and organs, for the use of the system which they, in the aggregate, compose.

Surgery is properly divisible into conservative and reparative.

Conservative addresses itself to limiting pathological action, and to restoration of normal function to the part involved, by mechanical support, and the supply of proper regimen.

Reparative consists in substituting lost parts by transplantation of tissues to repair organs, and by the use of artificial substitutes for such organs and parts of organs as will admit the procedure without seriously inconveniencing essential functions and parts.

The surgery of all nations is modified by their scientific, political and moral status.

The plague and famine rage in Persia to-day, because the standard of these attainments is low.

The circulation of the blood does not enter into the catalogue of medical teaching in Persia.

They have next to no knowledge of anatomy, and hence, they are destitute of pathology, surgery and hygiene.

And so pestilence walketh whithersoever it will, even in this boasted age of light, knowledge and wisdom, all over the once fair but now desolated fields of the old-time civilizations, arts and sciences.

Here is an opportunity for the new world to repay its debt to the old, in sending a scientific, medical and surgical corps to Persia.

Some concept of the correlations of growth of the parts of plants and animals, must find a lodgment in the mind before any adequate judgment can be formed of what we are entitled to expect under the varying circumstances amid which function consents to perform its work, or, in other words, amid which function is a possible resultant.

And this concept is the measure by which we limit our understanding of the cases brought to our observation.

As white light contains all colors potentially, so pure physiology is the concurrent potentiality of all functional activity; and disease, or pathology, is arrested or dispersed functional motion.

The anatomical elements called "cells" by writers upon histology and minute anatomy (which I prefer to call "corpuscles"), are endowed with an inner portion of protoplasm, called "nuclei," which receive and dispose of the pabulum that constructs and nourishes their proper bodies.

These nuclei may be likened to the stomachs of the entire animals—they are the receivers and appropriators of the pabulum upon which they subsist, precisely as the stomachs are the receivers and distributors to other organs of the crude pabulum of the whole body.

Anything, then, that disturbs the current of force or of

pabulum in its career of becoming integrated into corpuscle, tissue, organ and system, in which the individual sentiency or perceptive power resides, may accelerate or arrest function, physical or mental.

Pain, discomfort, or *dis*-ease is the resultant of obstructed neural or mental current.

The perception of pain may be both local and central, or central without conscious location, or local without invasion of the centre other than that of local pain instinctively perceived, but both local and central where we take mental cognizance at the time—local, when only automatic movements are produced that call mental attention, such as spasmodic recoil from contacts of mechanical and chemical violence, or startling news.

So interdependent are body and function, brain and mind, that they mutually act and re-act upon each other; or rather, we have no knowledge of any process separate from the machinery that evolves it, whether that be a mental process or a physical one.

The career of every body and every mind being a necessarily separate career or process, can, in the nature of things, be but partially apprehended or understood by any other similar mind and body; hence the necessity for classifications and records of physiological and pathological career of body and mind, with resemblances and differences, that we may legitimately estimate influences of all kinds upon our minds and bodies, for their help or their hurt.

Man, being the embodiment of all planetary and cosmical law and process, need not look beyond the confines of his own personality to become acquainted with the presentment of these laws and processes in the degree of their presence in his genesis, development, maturity, fruitage and dispersion, back into the great oceans of force and form, the conjunctions of which, in fractional presence, produced the earth and all its inhabitants, and set bounds of influence to every class, genus, species and variety of body upon its face and interior,

seriating them and correlating them upon a general plan of affinities and repulsions, so that each atom is related to the whole, and the whole not complete without each atom composing the body, world, system of worlds in solar tension, or the entire universe of God in the great sense.

So that when we shall have all knowledge pertaining to the least individuality conceivable or possible, we shall be able to range ourselves within the laws, and fulfil our career without obstruction or arrest.

So long as physicists and vitalists hold the dominion of physiological investigations, the science of physiology cannot be pronounced as a consistent whole, but will remain as it has been and is to this day, a congeries of contradictory facts and deductions, simply because investigators are not willing to let facts and observations explain each other, or remain for future explanation, by the sufficiency of survey to bring to light that which is concealed.

Analysis and synthesis of body and process must go hand in hand, that is progress together, to constitute either complete and satisfactory.

So soon as the idea of a single source of individual existence shall have seized the mind and become a fixed method of mental work, we shall have the basis of universal analogies, the cataloguing of which will thereafter constitute the annotations of science.

Then the beginning and ending of individual bodies and processes will be indifferent as to first or last, as all will be regulated by serial order of becomings and departures from the ever-changing points of appearance and disappearance of cosmical metamorphoses.

If the cosmos be infinite, it can have no additions or subtractions, therefore, it must be a plenum, and not a plenum and vacuum in any but a subordinate sense.

This plenum, then, it will be perceived, must consist in two-ness and not one-ness, if we are to have diversity of

individuals in the macrocosm and microcosm of which the universe is composed.

It will hardly be necessary to propound arguments to uphold this view and this statement of the differentiations that are apparent to the most superficial use of our powers of observation.

The great ocean, out of which being emerges to our perception, is the infinite fountain of force and form, the fusion of which present us with the differentiations of these two primates in the infinity of planetary existences, that so witchingly court our investigations, in the whole range of consciousness and physics, constituting the inhabitants of this earth and all related worlds, suns and systems, which are beginning to come within the grasp of mental reach through the microscope, telescope and spectroscope, with such distinctness that their relations and movements may be catalogued with the exactness of scientific method.

Spontaneous origin of tissues is acknowledged unwittingly by the most rigid advocates of the origin by germ theory, in the spontaneous division of nuclei, as the mode of cell-production by cell-division, so vauntingly paraded as the final clincher of argument in favor of "*omne cellula e cellula*," and they seem to think settled by their saying that the spontaneous division of nuclei and cells accounts for all ! ! !

Even the matix of fat globules is endowed with a darker and denser portion called nucleus.

Is this not the veritable proof of umbilicus and placenta being necessary points of incidence and departure of the movements that construct the least complicated and least esteemed portions of the living body, vegetable or animal; but by no means least significant, as this allusion will help us to perceive.

So if we would understand origin of body or process, we must not hold rigidly to a single aspect of either body or process, but take care to understand that there is a difference between the basal substance out of which a thing is built

up, and the plan or archetypal proportions by which these fractions of substance are brought into serial order and relation. A house or chair had a potential existence in the mind of the architect or chairmaker, before any of the material that constitutes house or chair were brought together for the predestined purpose of being wrought into these harmonious relations and proportions.

A good house or a good chair can only result from good and proper elements in the type and the material which in due co-relation satisfy the demands of stance and substance, or ideal and real presence of house and chair.

In houses and chairs statical qualities are desired, and hence we may hope to arrive at great proficiency in producing everlasting specimens of these, as are instanced in the artificially produced monolithic pyramids, monuments, aquaria, villas, etc., etc., by obedience to the laws of potentialities in the mineral substances composing them; the satisfying of whose affinities render the products more and more a unit, year by year, by the conversion of the softer silicates into the harder forms, more able to bear tensile force, thus becoming more resistant the longer they stand.

The human body occupies a middle ground between statical and typical or ideal bodies; and hence we might reasonably look for that which in fact occurs in this system.

That is; that some parts would be more immediately cognizable as being under the dominion of statical force, as in the hard tissues and others under the modulating typical force, as the fluids and soft-solids, and a third class partaking of alternations of equations of these two forms of force.

The vibratile balancing of these three forms of force in the human body constitutes what is called health:

The disturbance of this balancing is disease.

Now, I am aware that this balancing is no perfect balance —else the laws of crystallosophy would usurp the whole dominion, and the whole body would become statical, as a monolithic monument, and dismiss unceremoniously the

attendants upon the domains of cellosophy and corpusculosophy, without which in due concurrence of crystallosophy with these, the body could not be an earthly human system, with demands to satisfy, appetites to gratify, and aims to accomplish.

How much time it will require to render the pyramids and other mineral piles transparent as diamonds of the first water, will not now be asserted.

But as certain as undisturbed dominion of crystallosophy produced the diamond, just so certain will the undisturbed law of togetherness ultimate in that result for every pure mineral mass, long before the final *de*struction of the earth; and the giving up of the reign of law that now is.

One of the modes of expression of law, very important in health and disease, and a most potent agent for good or evil, as the case may be, is called "thermal motion."

Thermal changes are motions of molecules.

Could we control these in the body at will, we should have nutrient activity in our power. Extremes of this condition alike kill the molecules: When the change has not been too great, we restore by a gradual application of heat or cold, and where coagulation has taken place, we have recourse to surgical manipulations.

No marked advance has taken place within the year, in pathology and surgery.

The usefulness of the method of treatment of carious and necrosed bone, by the use of sulphuric acid, has been more fully established.

Two new remedies have been brought into use: viz; Thymol, as a substitute for creasote, and two forms of Acetic Acid:

Monochloro—and Di-chloe-Acetic Acid—all of which have been procured within the year. I have tried them and commend them as invaluable.

The Thymol in a glycerol to supplant creasote.

The Chloro-acetic acids as solvents of indurated tissues,

warts, corns, fibrous growths, and furfuraceous surfaces in general; they are to be used with discretion, pure or dilute, according to circumstances.

Try them and be blessed.

DISCUSSIONS.

DENTAL PATHOLOGY & SURGERY.

Dr. Atkinson—*Thymol*, the new remedy brought out in that report, bears a very near relation to phenol, carbol, and all that series. There is but a slight variation in the chemical equivalents of that and carbolic and cresylic acid. You know how I used to love creasote, but there was some objection to its smell. There is none to this. It is rather pleasant than otherwise. This agent is aggregated by an effort at crystallization, something like camphor. Thymol addresses itself pleasantly to the olfactory nerves of patients, especially homœopathists, with whom I always had trouble in the use of creasote. I have liked it from the very first. The difficulty I found in its use was that it was not fluid at ordinary temperature. I turned over some of it to S. S. White, who dissolved it in a certain proportion of glycerine and alcohol. I worked with it myself, and inferred that a saturated solution in glycerine alone would contain about five per cent. of thymol, and when the glycerine was proportionately mixed with alcohol, it would contain ten per cent. It turned out to be three and a half *per cent.* in the glycerine, and twelve and a half *per cent.* in the glycerine and alcohol mixed. Another difficulty in the way of the use of thymol pure is that it crystallizes too soon, perhaps before the affinity has expressed itself between that and the tissue, and this is a wasteful way of using it. It is more pleasant, more rapid in its action, more persistent and penetrating, and less escharotic than creasote. Hence I have introduced it, and endorse it fully. But just here I

would enter a caveat against using it too freely, as a large amount may prove fatal. We don't know how creasote kills, whether by arresting the neural current, or in some other way, we cannot tell. A person once took a quantity of it by mistake for brandy, and he couldn't get beyond the threshold of the drug store in which he was standing. I merely announce this new agent as a pleasant and useful help. It is very fine for ulcerous patches in the mouth, and is an arrester of molecular motion and a disinfectant.

Dr. Walker said that he had intended to prepare a paper on the terrible disease produced by the wearing of rubber plates. He had not done so, but hoped that the subject would be thoroughly handled. It was well established that the membrane of the mouth is five times as sensitive as any other. The observations of those who observe carefully establish the fact, that this is one of the greatest scourges of the age. It should be thoroughly discussed, and every effort made to get rid of it.

DISCUSSIONS.

HISTOLOGY.

Dr. McQuillen—The ground traveled over by Dr. Harriman obviates the necessity of my making a report on this subject. I may have stated positively, as alleged in the paper, that dentinal fibrils are coagulated fibrin, but I am not in the habit of stating things positively and without qualification. I have never been convinced, however, of the error of this statement. There is a very great difference in the microscopic appearance of a fresh and a dry tooth. If the tooth is dry, what are the tubuli if they are not tubes?

Dr. Harriman—There are fibrils in the tubes six months after extraction.

Dr. McQuillen—Do you prepare your specimens chemically—with chemical reagents?

Dr. Harriman—I do.

Dr. McQuillen—Then, of course, if the tooth is manipulated with chemicals it is in an altered condition. Would an astronomer go to work to dissolve the moon if he wanted to make observations upon it? I take the tooth as I find it. The soft parts will swell when the lime salts are removed. The remark was made by the gentleman that he was not able to discover any tendency to the formation of teeth until after the seventh month of uterine life. Now it is a well known historical fact that one of the kings of France was born with teeth, which would give but two months for the process of dentition to go on. In regard to the use of the term exos-

tosis, Prof. Judd took exceptions to the propriety of using this term in reference to the enlargement of the cementum. Now I have a preparation with me which I submitted to the Academy of Natural Sciences. It is a longitudinal section of a tooth, in which the difference between the several parts is apparent. I also have one showing the Haversian canals, canaliculi, and lacunæ of bone; another, showing the hypertrophied cementum. Occasionally, but rarely, you find a few canals in cementum, but the canaliculi and lacunæ are not arranged around them concentrically. I think any one accustomed to the use of the microscope—not its use as a mere toy—can distinguish between a section taken from bone and one taken from hypertrophied cementum. I could have wished that my friends in St. Louis had published my entire article on this subject, as I am not fully represented by what was offered in the *Journal.* Speaking of the soft substance, the essayist says that he was able to define the nerve cells in the fibrils. Now I want him to show them to me. I want that assertion backed up by demonstrations. I want to see these nerve cells. I ask how many men in this house have seen nerve cells?

Dr. Atkinson—There is evidently a boggle about terms and concepts of truth. I take exception to several points in that paper. I think that the mistakes made are due to a want of range of observation, but I recognize in the author a faithful worker. Bone, enamel and cement have characteristic differences. Now, how shall we recognize what is peculiar to bone? This depends upon the locality of the bone. A single stratum of a particular bone might contain no Haversian canals. Now this might puzzle a man who has thought that Haversian canals were essential characteristics of bone. The Haversian system is a portion of cartilage that has been converted into bone. All that intervenes between the lacunæ, canaliculi and periphery is calcified material. How shall we differentiate between that and bone? Suppose we have a simple calcification of a muscle or a ten-

don. Cut it, and you call it *bony*. The characteristic of bone is that it should have calcification, and if the uncalcified tracts are large enough, they have blood vessels running through them. What are Haversian systems? They are the metamorphoses of bone under the law of typal proportions. What is cementum? It is a medium of communication of pronouncements of force and form—a compromise between the law of the calcification of bone and its development. It may have canaliculi, but never Haversian canals—positively, never. The corpuscles of the cementum are never equally distributed around the canaliculi. Those next to the pabulum have more branches, and there are more corpuscles on that side than on the side nearest the enamel. What is dentine? It is a compromise between cementum and enamel.

[The hour of adjournment having arrived, Dr. Atkinson was recognized as having the floor for the following day.]

Dr. Atkinson resumed the floor—I had gone so far as to state that there were more canaliculi on the side next to the pabulum. I stated that cementum was an equation between the morphological force of bone and dentine. The enamel is half way between the intertubular structure and carbonate of lime. Hypertrophied cementum has been called exostosis, and I have been called a stickler for terms when I assert that they are different. But there is a difference in the degree of motion. But you may say, "it has no motion." It does have motion. Everything has motion. The elements in the diamond that glitters on the finger of a girl have motion, but it is *statical* motion. Put that in your pipes and smoke it. You may say I am a fool; but I have been crucified and clarified in my mind. The gentleman said in his paper that "cementum was nourished by corpuscles."

Dr. Harriman—By periosteum.

Dr. Atkinson—Well, by periosteum, then. What is periosteum?

A Member—That which surrounds the bone.

Dr. Atkinson—Then, I suppose if you would take this handkerchief, and wrap it around a bone, it would be periosteum. Periosteum bears the same relation to bone that the poles of the scaffolding do to a house that's being built. It is trestle-work. It bears up the blood-vessels. Corpuscles are nourished by an exact equation of force and form. The individual anatomical primal elements imbibe force, and that's nourishment.

Prof. Judd—There have been points brought out in the course of this discussion worthy of attention. In relation to the remarks made by Dr. McQuillen, he seemed to indicate that we had done him injustice in not publishing in our journal the whole of the article to which he refers. It was impossible for us to do so, and we disclaim any intention of doing him injustice. In regard to the use of the term exostosis to express hypertrophied cementum—an important question comes up, upon which it all hinges, and that is, whether cementum is true bone or not. If true bone, then its enlargement is exostosis. Dr. Atkinson has attempted to give us the characteristics of bone. The only essential characteristic of the bone, according to his theory, seems to be that the lacunæ have more canaliculi extending towards the surface than in other directions. I do not consider any of these, essential characteristics of bone. A trained eye can detect sections of bone taken from different parts of the same animal. We have lucunæ, canaliculi and Haversian canals only where they are necessary for nutrition. If this is true, then there is no distinction to be made between bone and cementum, as far as the use of terms is considered. On this point, different opinions have been held by different microscopists, but there are facts enough to arrive at the truth without any chance of error. Take a section of the femur, and we have the Haversian system fully exemplified; but we shall find no Haversian canals in the ossicles of the ear. They have disappeared.

Now go down to the *os unguis* of the mouse, for example, which is recognized as bone, and you will find that the canaliculi and lacunæ have also disappeared. Now if this is bone, and, as we have said, it is not denied, then Haversian canals, canaliculi and lacunæ are not the essential characteristics of bone. I have made some observations myself, but they have not been so extended as those of some other gentlemen. I do not know more than Beale, and a host of others put together, and I would be glad to hear from others on this point.

Dr. Atkinson—Will Prof. Judd define bone for us? What is bone?

Prof. Judd—There are things which it would be utterly useless to attempt to define. The *femur* is a bone. The *os unguis* is a bone.

Dr. Atkinson—In *post mortem* investigations, how are we to differentiate between what is bone and what is calcification—lime-ification—as the calcification of the aorta. Names mean something: they are expressive of the concepts of the mind. Now the *os unguis* is only recognized as bone on account of its position. Bones must be built upon cartilage or something analagous to it. A good many are formed from hyaline cartilage, and others from permanent cartilage.

Dr. McQuillen—As to the presence of nerve ganglia in dentinal tubuli, I would say that Owen was the first to recognize fibres in the tusk of an elephant. Tomes made demonstrations upon sections of teeth, and showed that there were little fibres projecting from the walls of the tubuli. As a true scientific man he did not assert positively that they were nerve fibres, but suggested that they might partake of the character of nerves. It may be coagulated fibrin. But now we have it here asserted, as though for the first time, that these are nerve fibres. The question arises, what is a nerve cell? When any one sees a true nerve cell

in a dentinal fibrilla, and can demonstrate it to me, then I will believe it, but not till then. The simple statement will not suffice. [Exhibited a preparation of a nerve cell, as found in the vesicular matter of the spinal cord, and then continued.] We come now to exostosis. I recognize the fact that the mere absence of Haversian canals is no reason why we should not call a substance bone. I have never seen a preparation of the *ossicles* of the ear or the *os unguis* of the mouse. Specimens are frequently prepared in such a way as to destroy the characteristics of the tissue to be examined. The great masters in art, such as those who produced the Apollo Belvidere or the Venus de Medici, did not rush off these things in a hurry, as many do in making these delicate investigations. Now as these bones are very thin, and periosteum being on both sides thereof, nutrition may take place without the Haversian system; but the large bones demand such an arrangement as this to convey nutrition. Nature forms structures so as to render the service for which they were made. All things, as Dr. Atkinson has repeatedly said, differ but in degree; but these differences in degree are of a marked character, and these constitute individuality. There are lacunæ and canaliculi in cementum, but they are arranged differently from those in bone. I have not found the Haversian system in cementum.

Dr. Harriman—In regard to bone, the so-called canaliculi have nothing to do with nutrition. Virchow tells us that he has discovered bone corpuscles, and says that bone cells are stellate. I can show you a preparation magnified two thousand diameters, in which you can count forty or fifty branches from these, and it is impossible to separate such a mass of substance as that. Bone is fibrous, cementum is fibrous, dentine is fibrous.

Dr. Walker was surprised that Dr. Cutler had been ignored in all this discussion. He was opposed to this Association being made a duelling ground for rival wits.

DENTAL CHEMISTRY.

Dr. H. A. Smith, who had been appointed chairman of that committee in the absence of the chairman of the last year's appointment, said that he had no written report, but would call the attention of the Association to the liquefaction of nitrous oxide. This constituted an era in chemistry. Faraday had done it in 1832, and it has since been done in Europe. Johnston & Bros. had prepared it, and would exhibit it, in connection with an apparatus, to the Association. By this liquefaction, perfect purity was gained. By the ordinary method, nitric oxide was apt to be present. But the latter gas liquefies at a higher degree of pressure than nitrous oxide, and hence conld not be present in a liquid form. Portability was another advantage gained by this preparation, thus adapting it to the use of the surgeon. By this apparatus, greater control over the amount given can be obtained, and none of it is wasted. To the chemist this was peculiarly interesting, as it was but the *avant courier* of what the future would yield in this direction. With the practitioner of dental and general surgery it must take rank with the grand discoveries of chloroform and ether, for the mode of application determines the value of agents just as much as their inherent qualities.

REPORT

ON

THERAPEUTICS.

E. A. BOGUE.

In gathering up the record of another year, in this department, we have to take cognizance both of successful treatment and its modes, and of hypotheses on which such modes of treatment may be based, otherwise our practice will continue to be empirical, which means uncertain, in this case.

The nearer we can come to *knowing*, the better our claim to being scientific operators, and therefore successful ones.

Our list of remedies has been enlarged by one substance that promises to be of the utmost importance to us, *i. e.*: Thymol, or Thymic Acid,—a white substance, of a transparent, crystalline form, procured from common garden thyme, and corresponding in appearance somewhat, and in many of its qualities to cresyl, or carbolic acid (as it is called, though quite improperly, as it is quite as much of an alcoholic character as of an acid).

Thymol is in some degree escharotic, antiseptic, probably stimulant, and so far as experiments have yet gone, seems to be anti pus formative, in much the same way that carbolic acid is, though whether in the *same degree*, is not yet fully proven.

It liquefies at a temperature of about 200 degrees, and generally returns to the form of solid crystals again, in from a few minutes to a few days, though it has been known to remain

liquid some weeks. It is soluble to a certain degree in glycerine—more soluble in the presence of heat apparently than without, and in this combination can be used. Its odor is that of the vegetable from which it is derived, well known in the kitchen garden, and not at all disagreeable. Its taste is sweetish, pungent, and, to many persons, leaves the after-effects upon the tongue and fauces that aconite does; a dry, burning sensation, very disagreeable, and lasting for some time; it is therefore best in using it to take the same or greater precautions than with the other agents of like nature that we are in the habit of using.

Its adaptability to the treatment of abscesses and ulcers seems very probable from the success that has already attended its use in that direction, and if it is equally destructive to microscopic animal and vegetable germs, as carbolic acid is, it will more than replace that substance as an application to be made to teeth that are pulpless, and that require opening for the purpose of filling, or bleaching, or even treatment for incipient abscess.

Going to the chemists and microscopists for the fruits of their labors, we find that both vegetable and animal matters decay from the action of spores floating in the atmosphere, or to adopt the extreme theory, from the action of the atmosphere itself, which vivifies the minute living bodies that are produced invariably in the decomposition of these substances, whether that decomposition take place through the process of mold, fermentation, or putrefaction.

Now it is very evident that if a substance that is surely destructive to these low forms of life (in death) be at once applied, there will be no further decomposition than has taken place upon the exposed surface, and we have an anti-septic in the highest degree.

When, therefore, we open a tooth whose root contains devitalized animal matter, it should be our first care to remove, in the presence of some anti-septic agent, every particle, so far as possible, of this matter, and that too, without wounding

in the *slightest* degree the peri-cemental membranes, lest we innoculate them with this broken down and devitalized matter, and so ensure an abscess in order to its expulsion. Having therefore taken away all the contents of the root, that we are able to reach, we apply Cresyl or Thymol, that we may prevent any further decomposition in the little inaccessible remnants that remain in the root, and having avoided touching the peri-cementum, we feel pretty sure that if the patient be in a usually good state of health, we shall have no abscess, or even soreness of the tooth, resulting from our opening the pulp chambers. We are now able to fill it permanently with oxy-chloride of zinc, if we choose, which in itself is also an anti-septic and an absorbent, and which, furthermore, is of a color more agreeable to place within the external enamel plate than any darker substance; then, if the tooth requires bleaching, we are ready to commence the process.

Among these anti-septic agents which have been in common use by us, are camphor, chloroform, ether, iodine, creasote, etc., etc.

In cleansing the roots of teeth for treatment, we may often use to advantage, at first, either the ether, or chloroform and camphor, or the alcoholic tincture of camphor, which more readily dissolves and washes away the animal matter than water alone would do.

In case of a very disagreeable odor, or a dark color to the contents of the pulp chamber and canals, we may use Larbarraque's solution of chlorate of soda, with which to wash out the cavities, by the aid of little wisps of cotton wound around a broach, or rather around several broaches, so that as fast as one is used, we may replace it by a fresh one.

In the treatment of necrosis, sulphuric acid is finding favor. It has been used in the proportion of 3 of water to 1 of the commercial acid—but this as a rule is too severe; probably elixir vitriol is sufficiently active, and is capable of dissolving dead bone, without affecting deleteriously the soft parts.

If there be a sequestrum of dead bone, it should be removed; if not, and it is easily accessible, an effort may be made to detach it, and after that, injections of the vitriol elixir, once in 36 or 48 hours, to dissolve what could not be removed with certainty.

As the process of solution through the action of the acid and the natural processes together, goes on, the need for the injections will become less frequent, and once in 2, 3 or 4 days, will be often enough.

If, after the solution seems complete, there seems to be pus still present, chloride of zinc, in the proportion of 100 to 200 grs. to the oz. of water, may be often used for a time, with advantage, as an injection.

Supposing the root to be in a healthy condition, and to be filled to a level with the margin of the gum, should the tooth need bleaching, we need to ask what has been the cause of discoloration? If iodine, we apply ammonia in as concentrated a solution as possible, being careful that the gums, lips and nostrils are well protected from its action.—If nitrate of silver is the discoloring agent, cyanide of potassium, can be applied, or iodine first, in tincture, and ammonia afterward; some hours will be necessary to get the best results from this treatment of discoloration from this cause. Should the color arise from an infiltration of the dentinal tubuli, with the iron or the hematine of the blood, oxalic acid is the proper bleaching agent, and like all other agents used for this purpose, should be placed in the pulp cavity in small amount, and in as direct contact with the open mouths of the tubuli as possible. In using oxalic acid, it will be remembered that we bleach the tooth at the expense of its strength; we shall therefore use a very small amount, perhaps a piece or two as large as a pin's head, placed in the pulp cavity, and dissolved by a drop or two of water, from the end of our syringe, put directly upon the acid.

In from three to six or eight minutes we shall have obtained all that can be hoped for at once, and the cavity

and mouth should be thoroughly washed out with warm water, after which, the balance of the pulp chamber, not already permanently filled, and the cavity of decay, should be filled with dry chalk, to be kept in its place by some temporary filling in the mouth of the cavity, and so left for a day or more.

When this is removed and the cavity finally cleansed and properly excavated, which should always be done after the acid has been used, the pulp cavity and perhaps a portion of the cavity of decay can be filled with thin oxy-chlo. zinc, and very often a still further improvement in color will be manifest; while, if the zinc be fresh and of good quality, the strength of the tooth is improved by its perfect adaptation to its walls and its inherent strength and hardness, being always kept quite dry.

Turning now to hydrate of chloral, which has begun to be used both generally and locally, for obtaining sensitiveness in dentine, we can never feel safer in its general administration than in that of chloroform; and for the ills that come under our hands for treatment, we may set it down as a rule, from which only the medical practitioner may vary, that it should not be given.

Its local action is extremely problematic, but if any imagine that relief from pain is the result of its topical application, there can be no objection to its use in that manner. As a further warning against its use as a general hypnotic, it is enough to notice the exceedingly small amount that has resulted in the death of the patient, twenty-five grs. in one instance at least.

Another means of lessening sensibility is, by soaking the cavity to be excavated, with carbolic acid, and taking out just enough to prevent spilling it over, filling it with oxy-chlo. zinc as soft and creamy as possible, then taking no pains to keep it dry, let the saliva soften it as much as it will. This may be easily cut out in twenty-four hours, when the cavity will generally be found far less sensitive

than before. This is a modification of the plan spoken of three or four years ago, when narceine, acetate of morphia and carbolic acid were stated to produce this effect. Longer experimentation has shown that the greater part of the effect was produced by the carbolic acid, and the oxy-chlo. zinc is both a convenient stopping for confining the carbolic acid in its place, and an augmenter of its effects.

Chromic acid was recommended a few years since as an obtainer of sensitiveness in dentine; it is now recommended in the treatment of ulcers upon the gums or mucous membrane of the buccal cavity anywhere, and is regarded by some medical writers as superior to any other application for these affections.

Oil of peppermint is stated to be useful as a local anæsthetic, and as it is a useful neutralizer of the odor of creasote, it will be an easy matter to test its efficacy.

The other remedies remain in their well known places and uses, and will only be superseded by substances well proven to be superior. Still, there is room for further additions.

REPORT

ON

DENTAL THERAPEUTICS.

W. H. ATKINSON.*

Therapia signifies "healing," the rootal sense of which is a making whole of function or part that has been made the subject of lesion, fracture, break :—

Any agent, then, that has this effect is a therapeutic agent.

Therapia, or therapy, as yet can hardly claim to be a branch of science.

At best it is only a collection of observations and deductions of administrations of remedies and conditions following, which are assumed to be the results of their actions.

In cases where the effect of an agent is palpable, its action may be observed and classified.

The classifications in therapia are crude and gratuitous in the main, as instance "emetics, cathartics, escharotics, discutients," &c., &c. These various terms being used to indicate the effects produced upon the body by their introduction.

Until we understand the process of the work effected on the body by the agent, or the work done by the body on

* Not knowing there had been a Report sent by the absent Chairman of the Standing Committee, on the above subject, Dr. Atkinson was appointed to prepare one during the session of the Association.

the agent; whether either of these are possible: also, whether the effects produced are not concurrent work of both agent and body, (which is most probable), we can make but little progress in the science of therapeutics.

Certain conditions are essential to therapeutic actions.

Temperature is a primal one, being the measure of molecular movement, out of which all other motions arise and by which they are graduated, in the relations of these in aggregate or segregate bodies from most diffuse gas to most concentrated solid.

Simple mechanical support is a therapeutic condition in cases where it holds fractured parts in the proper relations to favor the physiological, which thus becomes therapeutic process.

Therapeutic agents must be in a similar state of tension, attenuation of potency of force and form, or what has been called "irritancy" to the body to be acted upon, that the equation of currents may culminate in curative results.

Hence, they must be reduced at least as low as to the grade of fluidity, or that degree of molecular tension that permits them to flow like water, that the chemical and anatomical elemental equivalency may be expressed under the guidance of the typal force that limits satisfaction and dissatisfaction of the affinities that build and maintain these primates of tissue, to restore them to soundness.

Agents that induce or communicate polar tension to elemental bodies, are therapeutic: hence, proximity of mental and physical presence induce, simply by presence, the polar tension in needy bodies; while contact of mental and physical force communicates their special modes of action to bodies and minds in negative or asking status.

Some therapeutic agents are naturally in this and finer states of attenuation, and hence require no artificial preparation for immediate use.

Others are naturally held in the bonds of molecular and coarser affinities, and therefore require to be set free from

their confinement, that they may become useful in their practical application to needy tissues and bodies composed of these elements of bodies and systems.

The air in which our bodies are immersed is a potent therapeutic agent.

The presence of friends and foes is also capable of producing therapeutic effects.

Hence, those in charge of patients laboring under lesions of mind or body, should be aware of the potency of friendly and unfriendly contacts to enable them to secure the first and seclude the second.

In any case that the presence of friend or foe be not therapeutic, the person, part or patient should be separated from the destroying presence.

Thousands are to-day in a state of mental, bodily and social fracture of physical and affectional nature for the lack of the knowledge of these therapeutical principles.

This state of lesion has its origin in the false teachings that have prevailed requiring us to live in our intellects distinct from our affections; and induced all "educated" people to go about morbidly, smelling round for a state of their relations that they do not wish to find, but which their unrest has caused them to fear, and which their selfish wills can not—*will* not brook! Such cases remain the approbia of therapia (healing) in all the fields of its highest art, as exercised by the administrators of mental, moral and physical therapeutics in even the, so-called, best circles of social relation.

Were this not so, ninety-nine per cent. of the lesions of minds and bodies would be *nil*, and we should be able to live happily in the various relations of parent and child, brother and sister, friend and neighbor, in the human family, and be on tolerable terms of amity with the whole animal, vegetable and mineral worlds.

Is it not plain that all these are one in the great sense? It is proved in the fact of extracts from each possessing

therapeutic power over the deflections of body and mind, in cases too plain to admit of doubt.

If then, the primal bodies, the elements of tissue, are the elaborators of function under the enabling currents of force and form in all alternations of generations of the corpuscles, cells and tissues, by which systemic existence and function is maintained, is not the origin and character of those seed bodies of tissue necessary to our maintainance of systemic and conscious life. Regularly running up and down the morphological scale, serially performed, is physiology. When this is irregularly done it is then a pathological expression of the morphological "cycle."

Morphology constructs, stores and destroys the elemental primates, or the uni-oval, deut-oval and trit-oval manifestations of the morphological corpuscles, that are formed and fed, and fed and formed, in a cycle made up of the careers of the circles of these little bodies and processes, and their correllations in bodies and systems.

It is said that there are three kinds of osseous medulla, namely: gelatinous, yellow and red, the latter being supposed to originate the young blood corpuscles. Dissections of rabbits in the well-fed and starving conditions pretty certainly indicate this; as the metamorphosis of medullary substance exactly corresponds to heavy and light demands of the system for the primates of tissue.

As the wasting of organs occurs on the surface, we may infer that the supply must take place at the interior and progress toward the place of departure of the seed bodies, which is so clearly exemplified in the shedding of epithelial scales from all surfaces, mucous, serous or dermal.

The new agents that have appeared within the year, that have marked therapeutic affinities are thymol and the chloro-acetic acids.

The first is an acceptable substitute for creasote, and has been already noticed in the report just read.

The other two hold valuable affinity for dry and what has

been called dead connective tissue, or epithelial scales, indurations of the skin, warts and fibrous growths.

For correcting the unhealthy and brawny faces of those who use "Bloom of Youth," "Enamel," and other means to do the work of producing a beautiful skin on the face and hands, better than old Madam Nature does, by letting her laws have full play, which custom prevails to such execrable extent, the chloro-acetic acids judiciously used, stand unrivalled, by dissolving off the dried epiethelial cells, and favoring the normal growth of a new supply that make the radiant, roseate, youthful hue.

DISCUSSIONS.

DENTAL THERAPEUTICS.

Dr. JUDD stated that therapeutics was so intimately connected with pathology, that it was scarcely possible to consider the one without trespassing upon ground that might be as appropriately treated of under the head of the other. For instance, if one were to attempt to describe the therapeutic means to be resorted to in inflammation, it would be necessary to have a clear appreciation of the conditions of things found in the varied stages of an inflammatory action, because as much depends upon applying remedies at the proper time, as upon applying the right remedies.

For instance, in an early stage of inflammation we find that there is a dilation of the small vessels of the part, and a partial loss of tone in the muscular coat of the same. We will also premise that the want of tone in the muscular fibres remains long after the cause, whatever that may be, if the inflammation has spent its force and disappeared. Our therapeutic efforts in such cases are, therefore, directed to bringing back the normal conditions and lost forces, and in this way re-establish the condition of health. One of the most efficient means at our command for this purpose is the employment of cold. It not only contracts the vessels, by its direct stimulating effects, but it also stimulates the nervous system, and in this way the *vis nervosa* supplied by the *nervi vasorum* is increased, and the tone of the vessels is increased, so that when we have induced the vessels to contract, by the direct stimulation, and have in that way caused

the excess of blood to be expelled, the normal condition will then be maintained.

But suppose congestion has passed and stasis is established, would the application of cold do any good here? If we try it we shall signally fail.

We frequently read of cold being applied in the commencement of inflammation, and with complete success; and, again, we hear of it being applied in a later stage, with utter failure. A difference in diagnosis changes the effect of agents employed.

Now, what is stasis? If you will examine the blood in its normal condition, which may be done by placing a frog's foot or the ear of a rabbit under the microscope, you will see blood corpuscles passing in the vessels in single files, and always occupying the center of the vessel.

They will keep to the center of the tubes when turning the sharpest angles. In the abnormal condition of the blood, there is an agglomoration of the corpuscles in the vessels; —an abnormal impinging of the corpuscles on each other, and on the walls of the vessels. There seems to be a natural attraction, the one for the other. The vessels are blocked up, and the passage of the corpuscles is arrested. The *liquor sanguinis* is not in all cases arrested completely.

Prof. Taft—"Why do the corpuscles adhere to each other?"

Prof. Judd—"That cannot be positively answered. All that has been advanced on this point is mere speculation. I can give you my theory of the cause of this attraction of corpuscles, the one for the other. It seems to me to be due to a change in their electrical condition. Virchow said it was owing to an error of nutrition, but this does not explain it at all. But it is not difficult to determine when stasis has taken place; and supposing we have it, what is the therapeutic agency to be employed? Poultices were formerly used. The normal circulation is sometimes by this means restored. What is the philosophy of this action? There are

two processes by which the stagnation may be removed. Sometimes corpuscle after corpuscle drops off from the distal extremity of the mass, into the circulation, until the way is cleared; sometimes it goes on to the destruction of tissue, and the formation of pus. The philosophy of the action of poultices is, that they assist the action of the vessels, or, by causing the corpuscles to be broken down and absorbed, by supplying moisture to the vessels."

Prof. Taft—"Are not broken down, dead corpuscles poisonous?"

Prof. Judd—"I am not certain that I can answer definitely. They may be absorbed, but how far they are assimilated, we cannot tell. Now, suppose it has gone on to the destruction of tissue and formation of pus. We shall fail, if we attempt to cure this by application of cold; we may, perhaps, arrest the extension of the inflammation, or prevent its progress into the surrounding parts. The use of poultices may also direct the point at which the pus will be discharged. We may get rid of this pus, too, by a surgical operation, and where this is practicable, it should be done. There is, however, such a thing as the absorption of pus corpuscles—they being droken down by the process of fatty degeneration."

Dr. Thomas—"How is it absorbed?"

Prof. Judd—"By the venous radicles, I think, and by the absorbents or lymphatics. But we have absorption going on where there have been no lymphatics discovered, as in the brain and in the pulp of a tooth. The veins have a great deal of the work of absorption to perform. We follow on, however, until we have an abscess, with a fistulous opening. If we examine the abscess, we shall find a sac composed of connective tissue; under the microscope it will exhibit the wavy character of the connective tissue. It is, however, in young abscesses a homogeneous structure. If the abscess is a recent one, it may be easily removed by being broken

down; but in chronic cases it is more difficult, and therapeutic agents have to be appealed to."

Prof. Taft—"Why is it more difficult to remove this when it is older?"

Dr. Judd—"Because it is more highly organized."

Dr. Taft—"Has the sac vitality?"

Dr. Judd—"I think it is vital."

Prof. Atkinson—"I have been asked what the specific action of the therapeutic agent was, which I applied to the gentleman's corns. I answer, I think it was nothing but glacial acetic acid, though I thought it to be mono-chloro-acetic acid. We know, however, that this last substance has an affinity for connective tissue corpuscles that are dried up and collapsed. If we could consider what the body is that elaborates function, we would understand its abnormal variations. Taking the organism as we find it, the alternations of generation of cells constitute the reproduction of tissues. There are three kinds of corpuscles from which the body is built up—red, yellow and gelatinous. Connective tissue corpuscles are the origin of all the tissues in the body. Connective tissue is the warp of all tissue. The various tissues, nervous, muscular, glandular, osseous and dental, being connective tissue filled in by typal force, presiding over each of these branches of tissue, out of which the organs are constructed, and their waste nominally taking place by desquamation at the surface, or by metamorphoses of fatty degeneration, solutions, morbid growths, etc. When a tissue has worked very hard it gets tired. The cells are its laborers, and they cease to proliferate. The tissues are mechanically displaced in inflammation. A recent abscess can be more rapidly cured because there is less of diseased condition involved. This warped, curling membrane remains permanent. There are fewer and smaller filaments of connective tissue involved in a fresh abscess. The nuclei of cells correspond to the stomachs in our bodies.

Physiology is the exact equation of all the functions in the body. Any disturbance of this is *pathology.*

Any agent used to restore physiological condition from pressure to gas, yes, even to the kind word which you speak to your patient, and the influence of spirit, is a therapeutic agent. What is inflammation? It is the loss of equation between force and form—the cells themselves and the typal master, the demi-god that dwells therein. If we would study normal action, we would understand aberrations from it. *Sthenic* inflammation is sthenic nonsense. A tissue under an abnormal condition never possesses higher vitality than in a normal condition. If there is a hyperplastic condition existing, there is always an invasion of another territory. Each cell crowds the adjoining cells. Any agent that will act upon this—any physiological agent—is a therapeutic agent. Because of the pressure we have stasis produced. When we dissolve away this, the normal function goes on. We can do nothing until we understand that there may be irritation which stops the afflux and influx of physiological force. There is never congestion before stasis. The serial order begins by a lesion of nutrition, which is irritation. As soon as that is expressed, stasis begins. By this, mechanical pressure is communicated. The whole thing is accomplished by mechanical pressure. It is first colloid, then fatty degeneration takes place, and the process of healing is hastened by the heat melting the fat globules.

There you have the key to the whole, whenever you use heat and cold as therapeutic agents. Now, be sure you use heat or cold. If it is lukewarm, then spew it out of your mouth. I have taken out jaw after jaw, which has been destroyed by the violation of this principle. Keep it cold or keep it hot. You have an exemplification of this in the pain experienced by burning, which is removed when you bring the tissue, whose formation is thus disturbed, close to the fire. It is change of habitat of ghost.

REPORT

ON

ÆTIOLOGY.

S. P. CUTLER.

L. *Ætiologia*; G. *Airto logia*—from cause and description —The science of causes, or the causes of phenomena in medicine, the science of the causes of disease—in Dental science, the causes of dental disease.

In making the above statements, a universal fundamental principle in physics is understood or pronounced—That is, that causes always precede effects, or, effects always follow cause, there being no exception to this rule, whether regarded in the primary or secondary categories.

If a cause exists without producing any effect, such cause is either inert or inoperative, at least for the time being, in other words, lying dormant.

All active or operative causes always have their unerring and definite effects, though not always at first recognizable by man. We are to enquire into the causes of dental diseases in the aggregate, which have a broad field of investigation.

Subject of Dental Caries, Dental Gangrene, Dental Necrosis, so called by different writers, will first be considered, it being the most important of all.

We will first quote extensively from Tomes' Dental Surgery and Physiology, as we regard that as the best and ablest authority extant, and so acknowledged, and shall endeavor to point out many errors in his conclusions, prevalent at that time, and, to some extent, still adhered to by some.

Tomes' Book, Lecture 10:

"The first will include those in which caries is in itself considered vital action, and the result of inflammation; and second, in which caries is regarded wholly as the result of chemical action, caused by the presence of decomposing matter, lodged in the interstices of the enamel."

"Fox endeavored to show that dental is in nature similar to osseous caries; he assumes that separation of the periostium is the cause of caries in the bones, and that separation of the pulp from the surface of the pulp cavity, is the cause of dental caries, and, further, that in each, the separation is the result of inflammation."

Mr. Bell advances the opinion that caries is the result of inflammation in the dentine itself, and that from the low degree of organization of that tissue, it is unable to recover from active inflammation. He says the true, proximate cause of dental gangrene is inflammation, and says, "When from cold or any other cause, a tooth becomes inflamed, the part which suffers most severely is unable, from its possessing comparatively but a small degree of vital power, to recover from the effects of inflammation, and mortification of that part is the consequence." Many subsequent writers of distinction have supported these views, with slight modifications.

"Mr. Robertson, of Birmingham, stands prominent amongst those who assume that caries is nothing more than chemical decomposition of the tooth, and asserts that tissues composing the tooth are devoid of life, and, therefore, vital action cannot occur in them."

Now, as to the opinion of Mr. Fox: He maintains that separation of the periosteum is always the cause of caries in bones,and that separation of the pulp membrane from the pulp cavity is the cause of caries. Now, in the first instance, he is mainly right, though there may be exceptions to that rule, but in the latter statement and comparison he certainly is wholly at fault, and has not the slightest data for his conclusions. There is no parallel at all in the two cases. In

the first place, there is no direct connection between the pulp membrane and inner wall of the pulp chamber; the only connection being that of the nerve fibrils, millions of them passing through the membranes and into the corresponding tubuli, and no degree of inflammation in the pulp itself, is capable of causing any separation anterior to complete death of pulp, and then only from decomposition of the pulp tissue. After this, which is of constant occurrence, no caries is the result of this condition, under any circumstances. Mr. Fox in his conceptions is wholly at fault, so far as caries in the teeth is concerned. He regards the teeth as true bone—a great error. He certainly could have had but a limited knowledge of the true structural anatomy of the teeth. At that time the microscope was a very imperfect instrument, compared to the present, and microscopic anatomy of the teeth, but imperfectly studied and underderstood. Mr. Bell advances the opinion that caries is the result of inflammation in the dentine itself, and from its bone organization is unable to recover from the effects of inflammation, and caries is the consequence. What ideas could be further from the truth than these? From his statements we infer that he believes in the existence of vascular circulation in the dentine, which being wholly erroneous, all other conclusions based on these views must necessarily also be erroneous, and need no further notice.

Mr. Robertson, assuming that tooth substance being devoid of life, all caries is necessarily the result of chemical decomposition. He is nearer right than either of the others, so far as caries is concerned, though in regard to dentine being devoid of life, he is certainly greatly in error, which I am sorry to say is still advocated at the present time by some able men.

It will be seen that there is wide difference of opinion between the above named able authors, none of which are orthodox at the present time, with a majority of the profession.

Tomes says, "I believe that the dentine, from abnormal action, loses its vitality, and with the loss of vitality the power of resisting chemical action, and that consequently the dead part is, under favorable circumstances, decomposed by the fluids of the mouth.—That there must be a concurrence of dead dental tissue, and of a condition of the oral fluids capable of decomposing the dead part, before the phenomena of caries can be developed." Says further, "I conceive that the causes producing the abnormal action may have had a constitutional origin, and, therefore, have acted through the nerves on the circulating fluids."

It would seem that Tomes, even high in authority as he is, is considerably befogged in relation to caries.

He further says, "Death of the dental tissues precedes their decomposition," but in practice we know that the one has occurred by the development of the other.

Tomes thinks death of the dental tissues precedes their decomposition.—Then, in order to have caries, we must first have death of the tooth by some systemic agency, then followed by decomposition or caries. We all know better, at this day and time. We also know that a live tooth decays when the vitality is intact, except the very spot undergoing decay, and that this process is a local one, and purely chemical, acting about the same on live and dead teeth; the vitality in the dentine itself not being sufficient to resist the local chemical action, when the mouth gives an acid reaction for a considerable length of time, and favored by other circumstances, such as crowded teeth, interstices furnishing lodgments for food or other decomposable matters, thereby generating sufficient acid to slowly commence and keep up decay, even when the fluids of the mouth, in general, may be mainly neutral; if alkaline, as a matter of course all such acids would be neutralized, and no decay would follow. There are great differences in the teeth of different individuals, in relation to tendency to decay, when the oral fluids may be similar in all respects. From

the best data now extant, we are brought to the conclusion that these differences depend upon the relative proportion of mineral and animal constituents; those most liable to decay being most deficient in earthy salts.

We may even go farther than this; where the proportions are about normal there appears to be considerable difference in tendency, owing, no doubt, to the manner and length of time of dental development, which may be supposed to depend upon constitutional tendencies, such as perfect or imperfect nutrition of the whole system, and the dental tissues more especially.

There may be a deficiency in the ossifying process alone, from deficiency in amount furnished to these tissues, or even in due quantity or imperfect deposit.

This may possibly be governed to some extent by the length of time employed in the process.

The most probable inference is that the slower the process within certain normal limits, the more dense and perfect the structure; hence the more resistant to decay, owing probably to the atomic arrangements of the earthy salts in the dentinal cell structures.

Where a child is well developed, with sound parentage, and living in a healthy locality, with proper food and physical exercise, and oral cleanliness, there will, as a rule, be found sound and healthy dentures, and very little trouble during dentition. The healthy condition of the mother during gestation has a very important bearing on the dental structures of the child. These facts are fully sustained by observation.

When teeth are well developed as a rule they resist decay, if properly cared for, during life, and this condition of teeth would pre-suppose an equally good constitution. Subsequent systemic changes do alter, to a certain extent, previously good and bad dentures, in the one case for the worse, and in the other for the better, even when the other bones are not recognizably affected.

In induced syphilis the reverse effect may be noticed in constitutional forms.

Mr. Fox thinks that great changes take place in the economy of the teeth, by continued fever.

Mr. Bell thinks amongst the remote causes of decay, the use of mercury subsequent to their formation is one of the most extensive.

I am not prepared to fully accede to the opinions as advanced by the last-named writer, but to a certain extent I am.

Dr. Good says. "That caries of the teeth does not appear to be a disease of any particular age or temperament, or state of health."

Hippocrates believed that cold caused caries in teeth, and even up to this day there are adherents to this idea among the people. Mr. Charles Beur attributes caries to arrest of circulation in the organs, by pressure of the teeth upon one another laterally.

M. Ribe believes that hot food is a cause of caries, and endeavors to prove the same.

Fouchard, Auzebe, Bourdet, Lecluse, Jourdan, and most of the French writers of last century, believe in the action of local chemical agents as the cause of caries, though their ideas are obscure and unsatisfactory.

Salmon, of London, over two hundred years ago, believed in local causes of dental caries.

M. Tillacus says the Indians of North America knew nothing of carious teeth and debilitated stomachs until after the introduction of tea among them. But it is more likely that the contact of civilization, in its general bearing, is the cause of this change from healthy to unhealthy condition of the gastric and oral secretions.

Dr. S. K. Mitchell demonstrated, in 1796, that caries was caused by the presence of an acid in the mouth, and believed it to be *septic acid* (*nitrous*).

Harris says that acetic, lactic, oxalic, muriatic and uric

have been detected in the saliva in certain states of the general health. Donna says the saliva in the normal state is alkaline, but that the secretion of the mucous membrane is acid. He has detected acid in the saliva of patients affected with gastritis, and in children with apthae.

Harris says that Drs. L. S. and Eleazar Parmly, about 1821, were the first to promulgate the doctrine in this country, that decays of the teeth were the result of the action of external corrosive agents.

By a series of experiments made in 1843, by Prof. A Wescott, assisted by Mr. Dalrymple, it was proven that nearly all the acids, both mineral and vegetable, act readily upon the teeth.

Prof. Harris says, "It is possible that inflammation may influence the susceptibility of a tooth to the action of the causes which produce decay, even the appearance of the decayed part, but it is not the immediate cause of the disease. But it may be asked if caries be produced by the action of external corrosive agents, how is it that it sometimes commences within the bony structure of a tooth, and makes considerable progress there before any indication of its existence is observed externally?" I answer, it never does commence there. Its attacks, as I have before remarked, are always upon the the external surface. Sometimes upon the enamel, but most frequently upon the bone beneath the indentations on the grinding surface of the bicuspids and molars, and on the approximal surfaces of teeth, where this outer covering is frequently so fractured by the pressure of the teeth against each other, that the juices of the mouth find ready access to the subjacent osseous tissues. Decay may be gradually going on here for months and even years, without any manifest signs of its existence, and the commencement of the disease in these places has led many to suppose that it had its origin within the osseous structures. A thorough investigation of this subject would, I should suppose, convince anyone that caries always commences externally."

Tomes says, Lecture 10, "If a section of a carious tooth be examined with a lens power, or even with an eye glass, the carious portion will be seen to be circumscribed by a translucent line; this translucency is the result of the consolidation of the dental tubes. If this condition only existed near the dentine that has suffered sufficient decomposition to render a change of character evident, it might then be supposed, by some, that the translucency was the result of chemical and not vital changes.

"We have, however, when the decomposition approaches the first line of consolidation, a second one formed, and as this is advanced upon, a third.

"It is a curious circumstance that the consolidation does not go on gradually, from without inwards, keeping in advance of the decay, but occurs at intervals.

"It would seem successive portions of dentine loose their vitality, and that the contiguous living tissue becomes consolidated. The amount of consolidated tissue and the degree of consolidation, varies in different specimens. In one specimen there will be found a thick zone of consolidated dentine, completely isolating the disease; while in another, the band is imperfect, is interrupted at intervals, and unequal in breadth.

"Then again, all the tubes may be filled up, or nearly, or only a portion of them, or they may be imperfectly consolidated at intervals, with transparent matter. In all cases, however, we can trace some attempt at consolidation.

"Here, then, we have an analagous condition to that which obtains in soft parts when affected with inflammation, tending to abscess. The disease is circumscribed, and its extension prevented or arrested by the consolidation of the adjoining tissues.

"In dentine the progress of disintegration is not only retarded, but the ingress and egress of fluids through the dentinal tubes is prevented. Nature erects a barrier more or less perfect, to save the pulp from irritation.

"In teeth that have lost the enamel, from wear, and have consequently the dentine exposed, the exposed part is more or less consolidated. In teeth, too, in which decay has been arrested, and the exposed surface polished, the tubes near the surface are consolidated.

"The surface of stumps is often quite smooth and translucent, from a similar condition.

"Although the act of consolidation is a vital one, yet it is more than probable that the dentine, consolidated, loses in vitality."

Mr. Tomes has advanced some ingenious and instructive theories, based on observations, in relation to consolidation, as a vital defence against further ravages of the disease, like an army falling back, on the approach of an enemy, and re-fortifying at given positions, holding each position as long as practicable, without being outflanked by the enemy, by constructing lines of consolidation in the tubuli, by a vital process inherent in the dentine, but does not state how this is done, only that it is a vital process, by filling up the tubes, thereby cutting off communication, from the nerve, of foreign, irritating agents, that decompose the dentine.

He draws a comparison between this consolidation of dentine, with the sarcode, where any local inflammation exists. I am unable to see the point in his comparisons, although, the analogy would be tenable, if the premises were correct, which, I am unable to comprehend.

It is true, that around local inflammations there is an indurated condition of tissue, from coagulation of azotised compounds within the cells in the surrounding tissues. Whether this is a provision in nature or the economy to circumscribe the ravages of disease, or whether it is simply an accidental effect of a cause that might even be brought about with similar compounds outside of the animal economy. I shall not attempt to argue at this time.

He says the progress of destruction is not only retarded in dentine, but the egress and ingress of fluids through the

dentinal tubes is prevented, and prevents irritation of the pulp.

It would appear that he regards the tubes as unoccupied channels through the dentine, from pulp cavity to enamel, which idea I am not prepared to admit. If this is true, what causes sensitiveness in dentine during the life of this tissue?

Where a tooth has been worn from abrasion or fangs, and become smooth, polished and resistent of decay, there is no doubt, just at the surface, a filling up of tubuli to an indefinite distance, of some kind of matter as soft, and afterwards hardened by dessication, and becoming impenetrable to, and resistant of chemical action, that would otherwise cause caries. This substance is necessarily derived from the secretions of the mouth, and, like tartar, resistant and preservative and protective of the dentine below.

Tomes thinks the act of consolidation a vital one. If this be true, how could this take place in a stump devoid of vitality? I regard this process a molecular process independent of vitality, and, if necessary, abundant proof might be given.

When a decay has attacked the surface of dentine, there is a breach made to a certain depth, into both vital and mineral tissue, which are more or less under vital and chemical agencies combined, and, until invaded, controlled by vital forces alone. When decay is set up, so far as it extends the invaded territories are under chemical control, the chemical action first overcoming all vital resistance, by simply satisfying certain affinities that are stronger than the vital force. As the chemical constituents are the largest part the chemical forces are predominant, varying in different individuals and at different periods of life. This would appear somewhat heterodoxical when we are told, and I believe correctly so, too, that where there is the greater amount of mineral density in teeth, there is the greatest amount of resistance to decay. This is even true, and the

fact of deficiency of mineral elements demonstrates imperfect organization, hence, feebler vital and also chemical resistance. From this fact, that the animal per cent. is about the same in all, the difference being in deficiency in the mineral. When all the lime salts are removed from a tooth of a dense nature and from one just the opposite, the two are then just about the same in specific gravity, though before the removal of the lime, the denser tooth is much the greatest. There is a nominal balance between the animal and mineral, most essential to health and resistance to external chemical agents.

Prof. A. F. McLain, M. D., D. D. S., in his valuable pamphlet on the Causes of Decay in the Human Teeth, says: "The chemical hypothesis being now well nigh generally admitted by all correct observers, the physico-defective theory can be considered only as one of the proximate or pre-disposing causes, inasmuch as without the subsequent chemical action, no organic change is possible. If this were not so, it would be worse than useless; in short, it would be folly to attempt the arrest of incipient decay by merely removing it by filling, polishing, or by such other means as are usually pursued, I would add, so successfully, too, in many cases. Therefore, imperfections favor decomposition only by affording lodgment for foreign matters, which are rapidily converted through the warmth of the mouth into an acid product; or acids already formed may be taken into it, which are held in contact with the dentine and even with the enamel, and the constant action of these agents by frequent repetition, eventually terminates in decay."

I fully concur in the author's views, and I might quote still more with profit, only that space is wanting in this report.

F. Maury, in his treatise on Dental Art, says:

"Authors have never agreed upon the true cause of decay. Hunter supposed it to be a hereditary disease, and regarded it as a kind of necrosis or mortification of the dental sub-

stance. And Fox thought that it was a defect in the primitive formation of the teeth. Some have thought that dental caries should be classed among ulcerous affections, while others are modest enough to say that they know of no reason why the teeth should decay. For us, we believe that the disease is produced by primary causes, and that the causes are both external and internal.

"External causes of decay are flaws and contusions; all lesions of the teeth; the contact of cold air determining fluxions; the application of substances capable of altering the dental organs or increasing their nervous sensibility; the frequent use of acid drinks or aliment; the habit of taking at the same repast, very cold and hot drinks; the constant presence of saliva upon a certain part of the enamel of the teeth, and we may add mal-formations; lateral pressure of the teeth against each other; affections of the gums; malaria; the use of certain medicines, as mercury, acids, &c.; uncleanness; and such irregularities as permit viscous substanccs to penetrate their spongy parts, &c."

The author goes on to enumerate various internal causes of decay, which is but a repetition of other authors already quoted. It seems that this author believes in both internal and external causes, but bears rather strongly on the external causes; though at that day and time, and even now to a great extent, local or external chemical agencies are regarded the chief cause of decay.

Fitch's Dental Surgery:

"The first general causes of external caries, we proceed to notice, is a vitiated state of the saliva or liquor of the mouth. When I consider that lead, tin, copper, &c., are very soon dissolved in the liquor of the mouth; that even silver should be eroded and dissolved, as is sometimes the case with silver springs and plates when put into the mouth, and this is most commonly the case; that even gold, when scarcely acted upon by nitric acid, should become tarnished in the mouth, and that the finest and best ivory is there subject to

decay, I am not at all at a loss to conceive that, under some states of the saliva, it is capable of acting upon the teeth with the most pernicious influence, and causing a rapid decay of these organs.

"I will now enumerate some of the causes which affect the liquor of the mouth, and prove thereby indirect causes of decayed teeth.

"Every degree of uncleanliness, with respect to the mouth, is ready to vitiate its juices. Bits of animal food and many articles of diet sticking between the teeth and allowed to remain there for any length of time, become exceedingly offensive and injurious.

"All decayed teeth, decayed and dead stumps of teeth, not only create an offensive state of the breath, but vitiate the saliva, so as to prove a most active cause of decay in teeth."

He goes on still farther in enumerating causes under the above heading; also under a second and a third head of external causes of decay which I shall not give, owing to their length, and the purpose of this report not admitting. In summing up this report it will be necessary to state that the causes of decay of teeth are wholly dependent on violations of physiological laws, including, under this head, all the foregoing enumerations by the different authors, some of which, as a matter of course, may be regarded as erroneous, owing to the fact that every one heretofore has had opinions of his own, as they now have, from the fact that there has never been an established canon for the profession to be governed by as a settled code, every one having his own peculiar views, and, as a general thing, preferring to differ somewhat from his neighbor, in order to be considered original, and not a follower of any one else. It is true the exact facts in the case have not heretofore been fully understood by the profession. Certain results have been observed, and multiplied causes assigned, and great diversity of opinions advanced. The most modern, and the one, in this committee's opinion, nearest, if not absolutely true, is the chemical

theory of an acid action as the only direct local action, no matter how this gets in the mouth, the effect is the same in all cases, differing only in degree. The causes producing this acid condition may be various, but depend mainly on the condition of the mucous surfaces of the entire digestive appendages, and may be regarded abnormal, the result of violated law.

Modern civilization, in this country, when looked into, gives repeated evidences of violated law, which not only cause decay and destruction of the dental organs, but cause other pathological conditions as concomitants; which is suicidal, by shortening the natural term of existence of the human race.

REPORT

ON

DENTAL EDUCATION.

BY GEO. A. MILLS, CHAIRMAN.

Gentlemen of the American Dental Association—

As the chairman of your Committee on Dental Education, I now present to you the following matter. In presenting it, there is no desire to spend the time in unjust criticism of the past. The past is gone, the present is ours. So, only words of *soberness* and *truth* are becoming the hour.

The report of last year was charged with many *wise words* of direction; since they were spoken they have been wafted out on the soil of the profession, finding good ground here and there, taken root, have sprung up, and no doubt are present with us, yielding fruit; some have fallen on soil that had no depth, and have not borne the heat of the day, but withered; while some have fallen among thorns and been choked; and, perchance, many that have been blown up and down the land, have fallen on the ocean of time, and *will* be gathered after many days, so we have no need to falter.

We are told to sow beside *all* waters. Taking this as doctrine for our guidance, we have but to continue to be sowers of the seed, and it *will* bear fruit according to the *quality* of seed sown.

We have no need to doubt our advancement, every avenue is teeming with the spirit of progress. The powerful element of associated effort has, during the last year, done

a noble work, not so much, perhaps, in those localities where it has continued to sow and reap for many years past, but where the soil has been left to yield its own uncultivated fruit. From Maine to California, from South to North, the order is, go forward! and who will say we shall not go on to victory if we listen to our commander, who is the *way*, the *truth*, and the *light*.

Perhaps the inquiry has gone out during the year, and may be even now,—How shall we best extend the resources of dental education? This question, perchance, may find an answer in the discussions that will follow the reading of this report (if it may be regarded as such).

We have a right to expect much from those who stand out as the representative dental educators, who are gathered with us from year to year, and it is good to see so many present in this body, burning with the accumulated zeal of another year's faithful toil.

Gentlemen, speak out of the depths of your convictions, brought to you by the experiences you have had, be they of days of toil, or of years. Give us what you know to be truth. Do not indulge in vain speculations, but give us the gold of your service, as it has passed through the crucible in the fiery trial. Tell us, must we go down deeper, ere we can safely go higher? Do we need to adjust, to regulate, to separate, that we may better understand the work that is given us to do? If so, it is our duty first to ask what is our mission?

What do we answer to this interrogatory? Do we speak as one man, and say from the bottom of our hearts, it is a God-given, a God-loving one, or must we have our strength bartered by a division among us, calling it a mission of dollars and cents? Would, that with one voice, from this day, we might say, No! But, alas! all have not learned that "wisdom is better than riches." Nevertheless, the truth must be proclaimed. Our mission is of God. "Know ye not that ye are the temple of the Holy Ghost?" With this

truth before us, it is but a plain path that we are in. We are to repair the ravages of this disintegrated structure, so much as we can within the borders of our given specialty. Shall we attempt to repair, without a sufficient knowledge of the structure, that we may properly adjust, regulate and separate? Tell us what we need to understand, and more, give us the needed analysis of the mind, that we may rightly think for ourselves, and what is better, know for ourselves.

From what we have seen coming out of the associative element, during the years that have passed away, we cannot but say it has been the great auxiliary in dental education, due largely to the embodiment of the social element, which does much to bring us into a receptive condition, that so cultivates the avenues of our faculties, mellows the soil of our hardened natures, letting in the warm sunshine of brotherly love, fitting us in every capacity to receive that which will do us good.

Association is to us what the plough is in the tilling of the land. May we carry out from this meeting more and more of this spirit of honor which was gathered in, on the formation of this body, till it honor the whole profession that is now, and that may come after. And to you, who may be with us for the first time, may you become so imbued with the power of truth, as to go out from this body so instructed that you carry with you the unmistakable evidences, "known and read by all men," that you have been with truth, and learned of it.

The power of dental education has been, and will continue to be felt through all time, from the instructions received in the dental office. It is there the rudimental teachings are, and always should be, first received; and no dentist or faculty of a dental school should encourage an applicant to our profession to enter a dental school before first spending one year at least, (and in most cases more) in a dental office, for private teaching.

If you will give a retrospect of your experiences in this direction, you will, I believe, concur. The several dental schools are doing a noble work. Every year marks an increased interest, and a tendency to endeavor to meet the demands of the times. To say that they are being met, or that the scattered ability so divided in the several schools, is at all adequate to the demands so evident in all quarters, is a question which is being seriously and thoughtfully agitated in the minds of many. That the time has come when a combination of the best ability that our profession affords, should be made, and this United States be the proud possessor of an American Dental University, not for the purpose, necessarily, of the annihilation of the present dental schools, but as something that will meet the greatest demand that is upon us. To say that the time has come, is a question that it might be well for this body to candidly consider. Would to God (it will bear repeating) would to God! that this noble profession, which is rapidly fitting itself to stand on the highest of grounds in the scientific world, would be the first to throw out to the teeming millions, that motto of all others—obedience to the truth—stripped of all the meaningless titles that are attached so freely and so easily, to so many of those who are in the dental profession, because of the freedom with which they are dispensed, and with the ease they are gotten, they are become a stench to all true lovers of the truth. A man of worth does not need such titles. They detract from the dignity of his character. It is painful to see that some of our noble men are bedaubing themselves with such a multiplicity of them. Gentlemen, these words are spoken in sorrow, not with jeer. Consider them as you may, they are the truth; you can crush them, but you cannot destroy them. Our edifice, to pass through the fire, must be reared of gold and silver, and precious stones.

To return again to the present system of our schools. With all their worth, they are terribly deficient, and the

responsibility must be divided, and yet the heavy weight must fall on the faculties representing these schools. They have the power to reject applicants unfitted to enter their schools. As much as the real existence of the necessity for dental services is prevalent everywhere, rather than seek to supply the so-called dentist, better wait, that we better the quality, and lessen the quantity. No schools need to want for first-class students. Furnish first-class teachings and you will secure first-class pupils. While schools need much to encourage them, they need to be shorn of much. While we see much to admire, we see much to regret. While we see much to be learned, we see much to be unlearned. While there is some to be seen that is clear, there is much that is misty, and yet, in the light of all these deficiencies, if we turn to the past, and by the contrast with the present, we are renewed in our spirits.

Can you believe that we need to go back but a few years when there could be found in New York City and Brooklyn, so-called dentists, who did deny to students the privileges of books, to help them in their dental education, and in one instance secured (by theft) a volume of dental works in the possession of a student in their employ, and committed it to the flames! Such monstrosities sought only the "almighty dollar," at the expense of those who chanced to fall into their grasp. I would not have mentioned these facts, had they occurred among the so-called Quacks, or Gutter Dentists, but these men walked in high places, seeking whom they might devour. Educate our profession, and quackery will be shorn of its strength. And when we say educate, what mean we? Education that teaches knowledge of the blessings of obedience to law. We are groaning under the penalty of broken law—return to obedience and sufferings will come to an end.

It has been said that we are like the lobster, crawling backwards, feeling for the round at the bottom of the ladder. Every session shows this to be true, but it is not in

vain, for we have, and will again, listen to those who *dare* go to the bottom and delve in the vaulted treasures of the unrevealed. It requires courage to go down, and *vice versa* to go up. But, only he who has been down is fitted to go up. There is a disposition with some to remain in a fixed position, so called, but, if it is the truth we are based upon, we have no need to fear; truth crushed to earth will rise again and with renewed energy. So in what may seem time wasted or lost in delay, or what might seem a venture, will be more than made up by the accumulated vitality. Then, admitting this to be true, let us strip ourselves of all dogmas, and tarry only in research for the truth.

The considerations of qualifications of those seeking an entrance to our profession, is a matter which needs our watchful care. Can we say the responsibility is not in any manner ours? I think not. There are many ways by which we can perform this work. We can impress those who apply for admittance, of the importance of and the demand for certain qualifications. There are those from year to year, found in all our schools, who do not possess hardly a scintilla of the requisites in the specialty they are seeking. Some have not the first teachings of the common branches, and thus are wholly unfitted to have the least appreciation of the value of mental discipline.

Go to the classes admitted into the several schools, each session, and ask them what they seek, and what will nine-tenths of them answer? It will be, a business.

It is not for ridicule that these thoughts are presented, but that the mind may be poised, while the scanning of a future may be taken, and something of a measure of the responsibility may be had, that will, perchance, cause for the first time a thought of the realities presented, showing the entire nothingness of human efforts alone. Show a hungry man food, and tell it is his by the asking,

and he will not delay, except he be a fool, bereft of reason. Our sense of need must first be felt. When we come into a receptive condition, and are ready to follow the source of abundance, led on by the pungent perfumes of the rich viands, be our needs for the physical, mental or spiritual. In fact the analogy is the same.

That inspiration is the beginning of all knowledge is just as true as that God exists, and the quicker we touch bottom the better. With some it may require a sudden and rapid descent, that they may be saved. I say, dare not take the risk of delay. Let no one fear, but they will find the bottom—they surely will if they let go. Far better know whether you be a Peter or a Judas. If the descent is rapid, the return to light will be in the same ratio, and only him who is willing to pass through this transformation will ever be sure of his vaunted strength, and step forth as a strong man, armed to run a race, and he will not run in vain. "Walk in the light, and thou shalt know the blessedness of truth."

Is this standard too high? We demean ourselves if we seek for anything less than the highest and best. If we ignore here, our lives prove to the contrary, for we assume to be equal with any. Is there one that seeks less, who can rightly direct the mind seeking knowledge? I know that some may ask, what has this to do with dentistry? Yes, I know more. There are those who do (professedly) accept this standard, and nothing less, and better, a few are spreading all the sail at their hands, to reach the halcyon days of a full redemption, when the ravages of decay will close their worthless work. For it can be said and it may be (prophetically) that the signs of the times fully indicate all that the purest desire can wish. The struggle of nations are speaking with all the enginery of destructive warfare, down to the humblest speck of crippled humanity, crying out as much for prevention as for cure. Is it not true, that as we are better educated in the principles on which the

basis is formed, that we will more fully understand the preventive remedy? We cannot ignore the necessity of the dentist being educated to that extent, that he may be more than the so-called dentist, but a dental physician—a title that indicates that he is capable of dealing with all the conditions, relative to both health and disease. It does seem plain, that nothing short of a medical education is the demand of the hour, as well as a dental, and those who feel this to be true should bestir themselves, with every auxiliary at their command, to bring it about. That we move progressively, those demands must be freed from prejudice and brought square against the truth, for on this platform only can we prosper well. That there will be differences among us is not to be wondered at, but, it is possible, that we be of one spirit. "Let us, therefore, as many of us that be perfect, be of this mind." "Whereto we have attained, let us walk."

Something can be said profitably of our journals, that they are, what they should be, is far from the truth, and yet, we have reason to be grateful that they are so much credit to the profession as they are. The character of one seems to be quite unlike that of the other, and yet, all are doing something towards the supply of the dental pap.

The periscopic method is on the increase with all the journals, giving a decided advantage to all who read them. It will be said, and with much truth, that the success of the journals lies with the dental profession. Such should feel it a pleasure (that have any ability), to contribute to their pages, without fear of being rejected. It is safe to say, that the reading propensities of the dentists who associate most, increase most. No one, in the profession at large, can read our journals without profit.

The manner of imparting dental instruction by clinics has, during the year, shown a marked increase over any previous one. Very many, if not all, of the associations have observed them at intervals, in their State gatherings,

and necessarily with much profit. All the schools have discover the value of increased attention to them, and further a new feature of public clinics has been inaugurated by the First District Dental Society in New York City, and the Brooklyn Dental Society, City of Brooklyn. In New York City they are held under the direction of a committee, in the rooms of S. S. White's dental depot, each alternate Wednesday afternoon. Two dentists are invited to clinic; the records of all operations are kept and reported to the society. This society has been very fortunate in securing such room and facilities, and also in securing the attendance of a large number of dentists from all parts of this country, and others. In Brooklyn the clinics are held the first Saturday in each month, at the Brooklyn Dental Infirmary. This infirmary was established by the Brooklyn Dental Society, and is believed to be the first and only one of the kind. It has grown to its present proportions by the sacrifice of no little time and money, and it is earnestly hoped by those who have dental education at heart, that it may continue to prosper.

The dentists who have participated in its labors, clinics, have received a rich harvest.

The best method of reaching the public, is a subject that has had, and no doubt has now, a warm place in the hearts of some of its body. The most expedient manner, has not yet, seemed to be determined by this association. Some individual members have made some efforts, with how much encouragement will, perhaps, be made known at this session. There is no doubt but what every one will, as he gets wisdom, be more ready to impart it in a true spirit of liberality.

There are many items of interest that could be brought out with profit, in detail, but time is passing. So let all our communications be yea, yea, while we walk in the light, and nay, nay, when darkness presents itself; by so doing we will pass on in our day and generation, and those who come after will rise and call us blessed.

REPORT OF THE (NEWLY APPOINTED) COMMITTEE

ON

DENTAL EDUCATION.

C. E. FRANCIS, CHAIRMAN.

MR. PRESIDENT:

It can hardly be expected that your committee, but recently appointed, can do justice to a subject so important and comprehensive as this; and in the limited time allotted them to prepare a report fit to present to this body. In a place like this, where there is so much to attract the eye and fill the ear; where within the walls of this assembly and everywhere without, our heads and hearts are feasting upon the good things *already* prepared, there is little time for deliberate thought or mature reflection. Your committee will therefore offer as their "report" but a few simple suggestions, hoping, however, that they may tend to provoke a spirited discussion.

In a great profession like ours, so necessary—so indispensable to the requirements of the age, where health, comfort, and even life are dependent upon the judgment and skill of its members, it is essential that all who practice the dental art, be thoroughly fitted in all respects for their grand mission.

With the abundant opportunities spread out before us, it is time that the day of empiricism had passed. Our educational institutions, conveniently located in the several sections of the land; the various text books so accessible to all who seek their aid; the many periodicals that each

month come to our doors well freighted with practical thoughts and useful suggestions; the numerous organized societies in nearly every State and city of the Union, where professional thoughts are freely exchanged, scientific investigations fraternally compared and discussed, and the results of individual observation and practical experience related—it would certainly seem as if there was little excuse for plodding in darkness unaided by the light of science and ungoverned by its laws.

Within the last quarter of a century no profession under the sun has made such rapid strides in the field of progression as has ours; and yet as a whole we are far in the background when compared with other professions. This should not be the case; this *must* not be the case—indeed, the future of dentistry will testify that such *will not* be the case!

But let us look at things as they now exist:—

There are in this country some twelve or fourteen thousand dentists, of various grades of ability or *dis*-ability. Among these are hundreds, yes thousands, who have had little or no preliminary instruction. Probably not one quarter of this number read the current dental literature of the day, and are strangers to dental or medical text books of any description.

Now we all know that in families or communities where newspapers are never found, or where the current literature of the day finds no entrance, and books in general are wholly ignored—we expect to—and *do* find ignorance and superstition as the ruling elements. On this same principle, is it not true that the members of our fraternity who discard books and their teachings, are in a like degree wading in the slough of ignorance?

It is impossible to ascertain the exact number of dentists who are members of organized societies, for many leading gentlemen of the profession are connected with several distinct organizatitons. It is, however, vaguely esti-

mated that only about one-tenth of those who call themselves dentists are members of any dental association; and even of this comparatively small number, only about one in three take a genuine interest in the active working of their societies—such as preparing essays, participating in discussions, &c. Now why is this apathy?

We have in the United States at the present time, nine dental colleges, or incorporated schools where dentistry is taught, viz: one in Cincinnati, one in Baltimore, two in Philadelphia, one in New York, one in St. Louis, two in Boston, and one in New Orleans. These institutions are (we believe) all in a healthy condition, and each day doing a good work. It is only to be regretted that their sphere of usefulness cannot be more widely extended, and that every new comer who joins our ranks may not first receive direct benefit by their teachings. Indeed we might go still further than this and make it a legal requirement for them so to do. So long as a host of illiterate characters or bungling empirics drag heavily at our skirts, hampering and tinkering in a manner as discreditabie to the profession as damaging to their victimized patients, so long must we as a body expect to share the odium that must naturally fall upon their heads. We think a strong effort should be made to rid the profession of this incubus—this dead, worse than useless weight. We hope the time is not far distant when every State in the Union will secure safety to its citizens by enacting a rigid Dental Law; requiring every practicing dentist to show evidence of his ability and fitness to practice dentistry upon sound principles, combined with proper manipulative skill. Unthinking individuals may suppose that a law of such a character would be unjust, but it need not necessarily be so.

Suppose a board of censors be chosen from among the ablest practitioners of each State or district, whose duty it shall be to properly examine every applicant who may

come before them, giving certificates of qualification to each and all who are able to pass a satisfactory examination, and refusing to pass all others—what a great change would soon be effected!

If men already in active practice among the rejected be allowed a sufficient period of time (say three or five years, if necessary) to pursue a course of study or training that will enable them to pass the required examination —will they themselves not in the end be greatly benefitted? Will not their patients be doubly benefited; and will it not at once benefit and raise the standard of our profession? Surely no one can doubt this.

Taking even a mercenary view of the matter, a law like this must work favorably to both dentist and patient, for if a systematic educational training better prepares the dentist for the duties of his vocation, the more valuable will be his services to his patient, and greater will be the remuneration received for the higher grade of operations performed.

Now one additional suggestion will close this impromptu report. Regarding students: while your committee fully recognize the value of private instruction, and the importance of that practical knowledge which may be acquired by the student in the office and laboratory, when assisting his preceptor in the performance of daily duties, they cannot overlook the importance of that more extended and scientific knowledge of principles underlying the practice of dental art, which may be more thoroughly acquired by attending the usual course of lectures in some one of our excellent Dental Colleges: and your committee would therefore recommend that the members of the profession generally, impress upon their students the importance of pursuing a college course of instruction, after a reasonable period of private pupilage, and the advantages thereby gained. In addition to this, your committee would furthermore suggest to the represen-

tatives of dental colleges, as well as private preceptors, that they decline to receive into their schools or offices any applicant whose moral character is tainted with vice, and who does not possess, *at least*, a passably good academical education.

Then, when properly equipped, and fitted for the trials and duties of the great field before him, the student, having made a right start, may move forward in the path of usefulness and honor, receiving as he advances the well merited reward for his toil.

DISCUSSIONS.

DENTAL EDUCATION.

Dr. McQuillen stated that he might perhaps have been deemed severe in his criticisms upon a paper presented before the Association, but his conceptions of what a dentist should be, were exalted. He thought, in the first place, he should be a gentleman—a born gentleman,—and if he was not born one, he ought to make himself one. In the second place, he should be an educated gentleman, as his calling carried him in the very center of education and refinement. He thought education should be made compulsory, and all men could have it if they had the mind—the will—to get it. The advantage of a compulsory education was exemplified in Europe during the late war, in the grand movements of Von Moltke and Bismarck, who directed the movements of an army of educated men. It was all nonsense for a man to say he could not get an education if he had hands, head, health and heart.

Dr. Atkinson said that he had been teaching twenty-five years. He would require every dentist to be an A. M. and M. D. If this were so, they would not have to descend to the A, B, C's of the profession, but he confessed he, himself, was not far beyond the C. He thought that the spirit of fault-finding should not be cultivated. Fault-finding is not criticism. A system of education must be a serial cataloguing of mental concepts.

Dr. Walker endorsed all that had been said on this subject. He thought there was as much charlatanism among graduates as outside of them.

Dr. Crouse liked legislation, but he did not see what they were going to do for office boys, who were generally picked up from the scum of society, simply because they would do things which educated men would not do. He thought competition between colleges, as well as between dental journals, was unfavorable to thoroughness, as the colleges wanted to turn out as many graduates as possible.

REPORT

ON

DENTAL LITERATURE.

GEO. H. CUSHING, CHAIRMAN.

THE object of a Standing Committee upon Literature, in an organization of the character of the American Dental Association, should be, to advance the interests of the profession, through the discharge of its duties. This can only be accomplished by fair and judicious criticism upon what has thus far been written, and by suggesting such points for consideration in the future, as, in the opinion of the committee, will tend to accomplish the desired end. In so far as any criticism is made in this report, the committee desire and earnestly hope, that no one will for a moment suppose that anything personal is intended--for whatever is said will be in the kindliest spirit, and unless accepted in the same spirit, must fail of its legitimate result. In whatever suggestions the committee may feel called upon to offer, it will, in some cases, be necessary for them to traverse ground which might be deemed not legitimate for them to cover; but it will only be done when necessary to establish the soundness of their views.

Fully appreciating their want of proper qualification for the important duty assigned them, but also recognizing that this Association has a right to expect them to do their best, your committee proceed to the discharge of that duty, in the full confidence that their short-comings will be judged

leniently, while, should their report contain any suggestions of value, that such will be accepted and acted upon for the general good.

The periodical literature of our profession may, perhaps, very properly be said to be the most important, and will claim our first attention. Our profession is making such rapid strides in progress, and is necessarily all the time so far in advance of so-called text books, that we must look to the journals and the published proceedings of societies, for the latest improvements in practice and the highest advance in theory. From these we draw new inspiration, and without them our literature would soon be left far behind the age.

To say that our journals are all that they ought to be, would be very far from the truth, and yet when we consider with what labor and personal sacrifice of the editor they are conducted, and how poorly they are sustained, we can but wonder that they are as valuable as they are. But a marked improvement is perceptible in them during the two years last past, both in the merit of many original papers presented in their columns, and particularly in the character of reports of papers and discussions of the various local societies throughout the country.

In this latter direction, the committee seem to see great promise for the future. The evidence which these reports furnish of awakened, earnest thought throughout the profession at large, must be accepted as the harbinger of a good time coming, when all shall seek to know the truth, and when the shadow of darkness shall be removed from over us. Yet, while the improvement in our periodical literature is fully recognized, its imperfections must not be ignored. It is certainly very unfortunate that journalists cannot exclude from their columns much that, from time to time, appears in them, particularly articles that grossly mistate well established anatomical facts even; but they are obliged to publish much that is of little value, and some that is worse than valueless, and it becomes us to enquire

earnestly why this is so. There can be but one answer, and that is, the fault lies entirely with the profession. First, because many who can write well and instructively, will not; and secondly, because the profession, by the meagreness of their subscriptions, place it beyond the power of the conductors of these journals to be as independent as they ought to be. The remedy for this lies with the profession, and your committee feel that they should but poorly discharge their duty, did they not endeavor to arouse a proper feeling upon this subject, and to point out the way in which such reform ought to be brought about. First, then, let every man who is competent to write instructively, make it a part of his religion to furnish two or more papers annually, to some of the journals, and let every man who has anything to say—about any subject which he understands—write upon that subject as often as he has any thoughts to offer, even if his modesty leads him to think that he cannot write well, and when he sends his communication to the journals, let him ask the editors to revise before publishing, or discard altogether, if they deem it worthless. But let no man write simply for the sake of seeing himself in print. Such writers are very apt to attempt to handle subjects, of which they know little or nothing, and neither add to the general fund of professional knowledge anything of value, nor to their own reputations any degree of credit. And finally, let every man in the profession who subscribes for only one journal, at once subscribe for all the rest; while those who, unfortunately for themselves, have never subscribed for even one, let them take all at once, and not only take them, but carefully read them. So much for the duty of the profession at large. Now, although we must accord great credit to the editors of the journals as they are, they must not be held altogether blameless, and if they would aid as they ought, in this much needed reform, they will exercise a more careful revision of the matter which they print; and where an article is sent to them which is in part meritorous, while

some portions of it, in their judgment, ought not to see the light, they should kindly suggest such revision of the paper, to the writer, and thus confer a double benefit—by improving the character of their journal, and aiding their contributor to improve in his future efforts. When such course is mutually pursued by the profession and the journalists, then we shall have a periodical literature more worthy of the high position our specialty is destined to attain.

As coming under the head of Periodical Literature, the published volumes of transactions of societies must be mentioned. The last volume of such transactions issued by this Association, will compare favorably with those of previous years, particularly as to its reports, while the discussions, in some respects, gave evidence of advancement in the profession. The Illinois State Dental Society has, for the three years last past, published the transactions of its annual meetings, and your committee think they will bear worthy mention in connection with the proceedings of other societies of like character. And your committee feel confident that the plan of publishing in pamphlet form the proceedings of all our societies, could but result in very great benefit to the profession. In this way, much that is really valuable would be preserved, which otherwise might be lost and forgotten, and gradually would be accumulated a mass of material, from which some future writer would be enabled to compile a valuable work.

This plan of publishing proceedings would largely prove beneficial—by leading both writers and speakers to be more careful in presenting their ideas in proper form, and in stimulating various societies by the spirit of emulation.

It must not be forgotten, that very much that may be written or spoken, at our society meetings, which may seem of little value at the time, yet may be productive of the largest results—by suggesting ideas or trains of thought to those who may elaborate the most valuable truths and theo-

ries from them. This plan, then, is earnestly urged upon your attention, as being sure to prove highly valuable, if generally pursued.

Under the head of new works, your committee are aware of only two which have appeared since the last report upon this subject was made. These are Harris' Principles and Practice of Dentistry, tenth edition, revised and edited by Philip H. Austin, M. D., Professor of Dental Science and Mechanism, Baltimore Dental College, and Dental Pathology, by C. Wedl, of Vienna, in the German. The first of these comes to us under date, to the author's preface, of May 1, 1871, and your committee could only obtain a copy at too late a date to render possible a thorough review, or even reading of the work, but it calls for an extended notice, inasmuch as under the present revision, it is presented, as in great part, almost a new work. The most striking features which have presented themselves to the committee in the very brief survey they have been able to make only will be noticed. The preface informs us that the "the great advances made, since the death of the author, in Dental Physiology, Pathology, Surgery and Mechanism, demand now for the maintenance of the deservedly high reputation of the work, a revision in all its parts, more complete than any preceding one. At the earnest solicitation of the author's family, and of the publishers, the editor has, with much diffidence, undertaken this task. He has carefully revised that part which an experience of twenty years, as a teacher, has made him competent to investigate. The other parts he assigned to gentlemen of acknowledged proficiency in their respective departments.

"To Thos. S. Latimer, M. D., Prosector in the Baltimore Dental College, was assigned Part I.—Anatomy and Physiology, and a portion of Part II.

"To Ferdinand J. S. Gorgas, M. D., D. D. S., Professor of Dental Surgery in the Baltimore College, was assigned the remainder of Part II., and the entire Part III., Surgery.

Norman W. Kingsley, D. D. S., late Professor in the New York Dental College, has prepared, expressly for this edition, the entire chapter on Palatine Defects.

"To each of these gentlemen was given entire control of the extent and manner of revising the parts severally entrusted to them; the editor having simplified the author's original arrangement of parts, and suggested throwing together certain chapters and sections, the separation of which in previous editions was a source of some confusion. The editor, in his revision of Part IV., Mechanism, has found it necessary entirely to re-arrange his revision of 1863, and greatly to enlarge it—by the omission of some obsolete processes and unimportant details, by shortening certain descriptions, and by the utmost conciseness, consistent with clearness of explanation, he has, within the same number of pages, given nearly twice the amount of information."

The work opens with a well-written chapter, entitled Development of the Cell Doctrine, containing an epitome of the most popular views on this subject, and expressing the author's preference for the theories advanced by Dr. Lionel Beale.

Under the head of Anatomy and Physiology of the Mouth —the new arrangement of subjects is much more natural than in former editions. Thus, after a brief chapter on Osteology, come Bones of the Head and Face, Muscles, Blood Vessels, Nerves, Salivary Glands, The Teeth, and Tooth Structures.

In the department of Anatomy, a marked improvement appears, both as to the text and the illustrations, which appear to have been copied from Gray's Anatomy; in this respect the new edition must prove much more valuable than the old ones.

The chapter on Tooth Structures and their formation is almost entirely re-written, giving most of the more recent theories and investigations concerning this subject, though somewhat strangely, the researches and conclusions of Boll,

a German microscopist, find no place in this article, which seems the more strange, as his views seem to command the re-respect of some very careful and thoughtful students. In this article, as generally in the work, Dr. Beale's views are generally advocated.

The chapter in the old editions, descriptive of the eruption of the deciduous and permanent teeth, and giving the periods of eruption, seems to have been omitted from the new edition. It is impossible to conceive why this should be so, and if your committee have not looked blindly for it, they must believe it to be a grave error, as a knowledge of this process and of the natural order and time of appearance of the two sets of teeth, would seen to be an essential part of the education of those who are expected to care for them in a professional way.

The chapter on "Accretion of the Jaws," seems not to appear in the new edition, and the wisdom of expunging it may very properly be questioned. In Part II.—Pathology and Therapeutics—under the head of general considerations, considerable matter has been stricken out which could well be spared in a work of this character, while a brief description of temperaments, with their probable influence in diseases of the teeth, is very properly supplied. An excellent chapter, on the Diseases of the Mucous Membrane, has been added to this edition, while the chapter on Tumors of the Gums and Jaws is much more full and satisfactory than in former editions. The same may be said, too, of the subject of Alveolar Abscess, though your committee were disappointed that its treatment was not somewhat amplified, as it seems to them that it might have been, with profit to the student.

Uuder the head of Filling Teeth, brief reference is made to heavy foil, and the methods of using it—also, to the use of the mallet. A very brief reference is also made to the use and application of the Rubber Dam of Dr. S. C. Barnum —but its merits are very imperfectly set forth in the estima-

tion of your committee, who regard the Rubber Dam as the greatest invention ever offered to the profession, and deserving of a more extended notice and more earnest commendation than it receives in this work. In speaking of the filling of teeth, over exposed pulps, reference is made to the method of capping with oxy-chloride zinc, and its advantage over all other methods acknowledged—but the brevity of the instructions, regarding this treatment, and the proper manipulations, seem to be greater than the importance of the subject justifies. This is a fault which your committee consider is too apt to pertain to anthors, many of whom seem to forget that they are writing to instruct the *un*learned.

In this part of the work, too, while descriptions and cuts are given of the various old-fashioned drill stocks intended to operate drills at different angles—of which, the best that could be said was, that they but very imperfectly fulfilled their design—no mention whatever is made of the only really valuable and practically efficient instruments ever offered to the profession for this purpose, viz.: Green's Pneumatic Engine and Morrison's Burning Apparatus; the first of which has been in successful practical use and for sale to the public, for about eighteen months; and the latter, though but just ready for the market, was exhibited and its practicablity demonstrated at the last annual meeting of this Association. This oversight or neglect, seems neither just nor excusable.

In this division of the new edition, the same views hold prominence with regard to the operations for restoring with gold, in part or wholly, the crowns of teeth, which have been lost by disease or accident, that have obtained in the older editions. That is, such operations are almost condemned. Now your committee think that, even granting that these views were sound when first promulgated, yet that the experience of years, and the more advanced practice of the present day, call for a modification at least of the opinions then held regarding the value of such operations.

In this department of the new edition your committee are very much disappointed to find that its revision does not appear to bring it up to the higher standard which has unquestionably been reached both in theory and practice, for it is certainly true that, no matter what the individual views of the editors of such a work might be, they should have given a prominent place, in their revision, to those theories and practices which so largely prevail in opposition to those originally held by the author of the work under consideration, especially as such opposite views are earnestly advocated by very many of the leading men of the profession at the present day.

In the department of Mechanics, your committee regret that they have been unable to give it even a hasty perusal, as they are led, from a brief glance through it, to conclude that this branch has been very fully and satisfactorily revised, and brought more nearly up to the advancement of the present.

The only other portion of the work which your committee were able to give their attention to, was the closing chapter on Defects of the Palate. This they read very carefully, and in their judgment there is much in the preliminary remarks touching upon the effects upon speech and deglutition, which will prove of value, and, while the descriptions of the various forms of artificial vela, and the methods of constructing them, are well written, and would interest the general reader, yet, as instructions to students, or even old practitioners, which would enable them successfully to construct such an appliance, they are entirely valueless. Your committee would hesitate to express these views of this chapter, had they not been fully confirmed in their convictions by the testimony of three gentlemen of great intelligence, to whom the chapter was submitted, and two of whom were fully familiar with the processes described, having previously constructed several of these vela.

Imperfectly as your committee have been obliged to review this work, for want of the proper time, yet they have endeavored to deal justly with such points as they have touched at all, and when criticising and expressing positive convictions, have only done so after careful reading and consideration of the parts criticised. In summing up, they regret extremely to be compelled to say that, while the work in its general arrangement, and in certain particulars, is very much improved from the old editions, yet, that in certain omissions it is gravely at fault, while as a text book, as a whole, and intended to express the present advance of the profession in theory and practice, it can hardly fail to disappoint the hopes which had been entertained concerning it, and which the high qualification of the revising editors justified the profession in entertaining.

The work on Pathology, by Prof. C. Wedl, your committee can make but brief mention of. But through the courtesy of Dr. C. R. E. Koch, of Chicago, who has translated the chapter on Theory of Caries, and who kindly went over the various chapters of the rest of the work with your committee, they are able briefly to point out some of the principal features of the work, and to express a qualified opinion upon its general merits.

In the opinion of Dr. Koch, the work is plainly and concisely written, the subjects naturally and fully treated, and the theories and opinions expressed without arrogance or assumption, but seemingly with only the candor of thorough conviction which has come from patient study and investigation.

There are some features in this work which seem rather peculiar to it, or at least, which your committee do not remember to have observed in any other work; for instance, the specific gravity of various classes of teeth is given, showing differences varying from 1.08 to 2.17 in deciduous teeth, and from 1.98 to 2.53 in permanent teeth. Also some experiments are detailed, tending to show the power of

resistance to cleavage and the line of cleavage, as also others showing the elasticity of the teeth.

In the chapter on "The Theory of Caries," the author seems, in the opinion of your committee, to very fairly settle the question of the influence of fungoid growths in this process, and to conclusively establish that they are in no sense to be considered as one of the causes of dental caries. In his closing remarks upon this subject, in answer to Leber and Rottenstein's belief that the differences in the progress of dental caries, between enamel and dentine, must have its cause in the participation of fungoid growths, (*Leptothrix buccalis*), in the carious process, he says, "the elements of the fungus certainly luxuriate into the dentinal canals, and expand these, but in my opinion, can only accomplish this when the dentine is either entirely decalcified, or has at least entered upon the first stages of decalcification. I have never found a fungous growth in the deeper layers of still hard carious dentine, and hence, am of the opinion that the dentine, to a certain extent, must have died at an earlier time, through the action of acids, when the fungus was enabled to grow on farther." In summing up the order of conditions under which the frequency of carries declines, he gives as the last named condition—"When the structure of the whole denture and the mucous membrane of the mouth, together with the glands, is a regular one in proportion to the influences of race and hereditary transmission, and then says the last named point gives the main reason for the frequency of caries in general, and stands in close relation to the structure of the whole organism. The quality of the food has only a secondary importance." These extracts are given, that some idea may be formed of the general style of the writer, as well as to show his conclusions upon the points cited. It is believed that this is the first work on Pathology ever written as exclusively pertaining to any specialty of medicine; and your committee are led to conclude that the work will prove to be one of value to the profession, when it

shall have been properly translated. It seems to give evidence of thorough research and investigation, and the author's views are apparently presented in such a manner as to justify the careful consideration of the student.

In offering some suggestions concerning the needs of the profession in this matter, your committee propose only to refer as briefly as may be, to the lack of proper works on Dental Pathology, in the broad sense of that term, as including Ætiology and Therapeutics.

That we have any literature worthy the name, upon these subjects, cannot be truthfully affirmed.

Of the importance of a more familiar acquaintance with the laws which govern the diseases we have to treat, it should be unnecessary to speak, and yet it must be apparent to every thoughtful and observing mind in the profession, that the want of information on these points is palpably great, and the more deplorable because it is only upon a full understanding of Pathology—including Ætiology and Therapeutics—that the highest conservative practice can be based.

This lack of knowledge upon these subjects is due largely of course to the absence of proper text books, but even more, perhaps, to a lack of proper appreciation of the importance of such knowledge, and a disinclination for such study as is requisite for its acquirement.

The idea that the teeth are a part of a vital organism, are subject to the same physiological and pathological laws which preside over the vital forces in the entire body, and are liable to diseases of various kinds and from various causes, would seem to have no force in the minds of a large part of the profession, even among the more accomplished and better informed, judging from the evidence of their daily practice, writings and instructions. And yet it requires no lengthy argument to demonstrate to every conscientious practitioner who exercises his powers of observation, that there has as yet been no satisfactory solution offered to the many problems which daily present themselves for his con-

sideration in the mouths of his patients. The generally accepted theories fail to satisfy his studious inquiry—and he can but be forced more and more to the conclusion, the longer his experience, that he has to deal with a part of the living body, the diseases of which must be governed by the same general laws as those which preside over the whole body, and yet, which seem to be more difficult to understand, and more obscure in their origin than perhaps any others. With such evidence of daily observations before us, how can the importance of study in these directions be ignored?

One of the conditions necessary to the advancement of the profession beyond its present condition of ignorance, and its development of that higher intelligence which it is surely destined to attain, is essentially that proper text books should be provided, wherein the landmarks shall be so clearly defined that the student need not go astray.

Of the character which such works should possess, much might and ought to be said, for it is believed that very few so-called text-books come up to the proper standard, not only of knowledge, but also of the methods of instruction.

In the study of any profession, the general principles underlying it should be thoroughly considered and understood; they are the basis upon which only can the superstructure of a true professional education be erected. But it is just as essential that the method of application of these principles should be clearly taught, in order that successful practice may be established.

It is often remarked by prominent and learned gentlemen at our various associations, that the discussions should be more upon general principles, and not so much upon details of practice; that this association particularly should be confined to the consideration of general principles. While this is in a measure undoubtedly true, it should be borne in mind that our profession is as yet in its infancy, and it is probable that gentlemen who express these views

do not stop to think that discussions, confined entirely to general principles, would prove of but little immediate service to the mass composing the profession, while some details of practice, with special application made of the principles governing them, would be of incalculable advantage to the mass, not only in illuminating the cases particularly referred to, but in suggesting the method of application of general principles in other cases.

It must be remembered that very few men in any profession have the ability to make proper application of general principles in special cases—in other words, to devise methods of treatment based on those principles, without some other instruction. The men who can do this, stand out in very bold relief from the mass, and do not generally realize how few there are who need to know only of general principles.

What is needed then, would clearly seem to be works on these subjects, comprehensive in scope, clear and concise in language, and apt in illustration, showing cause and effect in every application which it would be possible to detail in a work of this kind. Such works should be written upon the supposition that the reader knows nothing, and has only an understanding of the meaning of plain and simple language. When thus written by competent authors, they will prove of inestimable value to the profession, and, through it, to mankind.

The best example of how such works should be written is to be found in the works of Prof. Tyndall on Heat and Sound.

Here we see one of the foremost philosophers of the age, writing in such a manner upon subjects hitherto but imperfectly understood, that now any mind of ordinary intelligence can readily comprehend them.

While stupendous strides in advance have been made in the operative department of our profession, and commendable progress also in the study of general principles govern-

ing our practice, yet it cannot be denied that the profession is as yet decidedly in its infancy in that department which should be the ground-work of our art. A glance only at the various theories in the Ætiology of our profession will suffice to establish the truth of this position. Whether we accept the chemical, the vital, or the chemico-vital, or even the parasitic theory, as accounting for the cause of dental caries, the mind of the careful observer must remain still unsatisfied, and the conviction be forced upon it that none of these, nor all together, will suffice to explain those causes. The generally accepted theory is doubtless, that of chemical action, as the immediate cause of caries.

Predisposing causes are generally referred to in this connection, as being imperfection of the structure of the teeth, both as to the fusion of the enamel, and the proper consolidation of the dentine, so that they are unable to resist the action of the destructive agents which in the nature of things they must be exposed to.

Can it be affirmed that this is at all a satisfactory explanation? Does not the experience of every intelligent observer in the profession, say that there must be something beyond this which has not yet been reached, to satisfy the demands of investigation?

Is it not true that we are daily witnessing teeth that, so far as it is possible to judge of them, are the class referred to as constitutionally weak and predisposed to decay, and which are also subjected, apparently to a great extent, to immediately destructive causes that are, notwithstanding all these seeming adverse circumstances, retained in a comparatively sound condition, requiring but little filling; while, on the other hand, that class of teeth, apparently just the reverse of the first, strong and dense in structure, and well cared for, are frequently found to be subjected to a large degree to caries, sometimes to an almost hopeless extent? Are not these phenomena of sufficiently frequent occurrence to seriously challenge our attention, and to force us to seek

their solution elsewhere than in the mouth and teeth themselves? And must not the conviction be forced upon us, that only in so called constitutional disease can be found the solution of the mystery? In other words, that dental caries is not simply a local disease, but is the local expression of constitutional disturbance.

It is not denied that what is observed in the mouth as dental caries, is the immediate result of chemical action, but it is believed that, in most cases, this chemical action is only possible, by reason of the constitutional derangements which impair the vital force of the teeth, to resist the action of agents which, in the order of nature, it was clearly intended they should, in a state of health, be able to resist. If this view is grounded in truth, then it must be affirmed that constitutional disorders, both as weakening to the vital forces of the teeth to resist the encroachments of destructive agents, and as producing a vitiated condition of the secretions which render them destructive, are to be considered as the causes of dental caries, and that they should be amenable to constitutional treatment. If this be true, what a field is opened for the investigation of the profession, and how sedulously ought it to be cultivated.

The time is surely coming when therapeutic treatment will be as imperatively demanded as is now operative, when one shall be established to be the necessary complement of the other. It is in this field—that of prophylactic treatment in our specialty, as well as in general medicine, that in the coming time, the highest honors will be won.

This leads to the affirmation that the dental practitioner should be educated, to the fullest extent, in general medicine, if he ever hopes to develope the highest capacity for beneficence, and the time is not far distant, let us hope, when this will be generally recognized and demanded by the people. Then the treatment of the teeth will no longer be referred to as a mere mechanical operation, and the profession of dentistry will take its proper rank among

the learned professions, while it may justly claim to be considered as truly among the foremost benefactors of mankind.

It must not be inferred that the magnitude of this proposed work has been overlooked or under-estimated. The work will be immense, which shall give to the profession the results of experiment and research necessary to the desired end, while such investigations will be attended with peculiar difficulties and embarrassments, for reasons which will be obvious to the professional mind.

To such a work must be brought a mind well stored with knowledge of the general principles and practice of Medicine, and trained in observation and investigation, together with an almost infinite patience and diligence, and the power to cast aside all pre-conceived notions, as facts develope the falsity of old opinions.

In every such investigation all facts need to be carefully studied, and often corroborated; observed, established facts only, affording competent evidence from which to deduce sound principles, and thus sound practice.

Your committee have, seemingly, wandered from the subject, only that they might present some grounds for the position they assume, in offering suggestions to this association touching the dental literature of the future. They feel that the spirit of the age demands text books of the character of those here referred to; that it is the great demand which ever presses upon us, and which must, sooner or later, be satisfied,

Feebly and imperfectly as these views have been presented, your committee felt impelled, by a sense of duty, to say thus much, and with the hope that their efforts may not prove entirely fruitless, leave this report in your hands.

IMPROMPTU REPORT
ON
OPERATIVE DENTISTRY.

J. TAFT, CHAIRMAN.

In this report, nothing more than a mere statement of a few points pertaining to operations upon the natural teeth will be attempted. The report of last year was very comprehensive, embracing and presenting every point of material interest in the operative department up to this time.

It is very gratifying to know that progress is hereby made, and, perhaps, more rapidly than ever before, in this direction. This progress is not alone of a mere mechanical character, but it is quite apparent that there is a constantly growing domination and guiding influence of science over art, of principles over manipulation. More are now able, better than ever before. to give a reason for the faith that is in them.

In reference to modes of procedure in the different operations that devolve upon the dentist, there are no startling facts to announce, though forward steps are being continually made, yet they are of such a character as to render it impracticable to give any one of them much prominence in a report of this kind. There is now a far greater disposition, by the body of the profession, to adopt new modes and processes, especially those that are proven valuable, than ever before, a clear illustration of which there is in the rapidly increasing use of the rubber cloth, for protec-

tion from moisture in the operation of filling; a thorough knowledge of which, carries with it conviction of its great value, and, usually, its immediate adoption.

In the operation of filling there is found a constant growing disposition to greater care and thoroughness. The effect of filling a cavity of decay in a tooth, is not definitely attained without a fixed and careful attention to each and every step involved in that operation—an imperfect link involves a broken chain. It is not the intention here to discus the various steps in filling, but we would suggest that the profession strive to come up to the attainments already made. That execution, desirable in many cases, cannot be obtained without the assistance of glasses of considerable magnifying power, and those of the best definition. This is a subject to which sufficient attention has not been given. Glasses, with good definition, magnifying from two to two and a-half diameters, will detect imperfections and irregularities that, to the unaided vision, escape observation altogether. The careful and discriminating use of glasses in the operations upon the teeth would be of great benefit to every one, and will not be injurious to the unimpaired eye, as is generally supposed.

In the manner of the use of foil, some change has been suggested within the last year, especially with reference to the manner of its consolidation, which consists in the employment of smooth and polished points, instead of the serrated. It is claimed that the former may be substituted for the latter in all cases, even in building up crowns as well as in filling cavities, and that the results are much more perfect. However this may be, it is quite certain that, with smooth points, well formed and properly directed, gold foil may be very thoroughly welded together. It is also claimed that under the smooth points the gold, in filling, will expand more readily, and thus be more perfectly adapted to the walls of a cavity, and that, too, without the walls being injured, as is sometimes the case with the sharp or

serrated point; and especially is this a matter worthy of attention, so far as the adaptation and consolidation of gold about and upon the margin of cavities are concerned. Our frequent source of failure is found in the injury done to margins of cavities; fracture or commotion of the enamel or dentine, to some extent, is of frequent occurrence. An extensive fracture of the enamel sometimes occurs, and in almost every case is a source of mischief. The occasional employment of smooth instruments was, perhaps, adopted by a few persons two or three years ago; but their employment of these to the exclusion of serrated points has only been within the last few months. The claim to the first extensive use of these points has been made by three or four persons, but no one has pronounced so definitely, and so enthusiastically in their favor, as did Dr. A. A. Blount, of Springfield, Ohio, about five months ago. The introduction of a change, so definite as this, will not be very rapid, even though it should, in the main, be admitted to be a step in the line of progress.

The use, and appropriate place, of heavy foils, is more definitely pronounced than when the last annual report upon this subject was made to this body.

While a few use them exclusively for filling, the majority employ them, after a cavity has been chiefly filled with lighter foil, to form the surfaces and border coverings, and with the heavy foil this can be better done than with anything else. How heavy foil may be advantageously used is yet problematical. It has been asserted that foil No. 480 may be used—the practicability, to any considerable extent, is very doubtful, still, from six to ten thicknesses of No. 60 may be very easily and thoroughly welded upon the surface of a filling; to accomplish this, however, the lamina must be kept free from crimping or folding.

In the direction of non-metalic plastic fillings, the preparation known as "Guillois' Cement," seems to possess greater hardness and resistance than any of the kindred

preparations, their properties being so great as to induce many operators to employ it for permanent filling. Its efficiency for this honor is yet hardly sufficiently demonstrated, but as a foundation for gold filling, in many cases, it is very valuable indeed. Of its constituents and mode of preparation we are not informed, though it is, doubtless, in these respects closely allied to the oxy-chloride of zinc.

With reference to the instruments and appliances, used in operations upon the teeth, constant changes and improvements are being made, an example of which is seen in the improvement made within the last year, upon the machines for operating cavities and finishing fillings. At the last annual meeting of this body their utility was a matter of doubt and incredulity with almost every one, Now, in two of them, such is the perfection, efficiency and extent of usefulness attained, that a first view carries conviction to every mind, and they are now regarded as indispensible to the most thorough and rapid execution of the operation of filling. The same, to a certain extent, is true of many other implements and appliances used by the dentist, and the experience in this respect, in the dental profession, is but a repetition of that which is occurring in every department and avocation of human occupation. We cannot venture to assert what is in store for us, or what shall be brought to us upon the great tidal wave of progress, that now rules heaven high, over all departments of human occupation, but we can admire, appreciate, use and rejoice, in all the blessings bestowed upon us.

DISCUSSIONS.

OPERATIVE DENTISTRY.

Dr. Atkinson said that the American Dental Association was no place to go into details of operations. He had endeavored to get platinum beaten in 1845, but had not succeeded in doing so until a year ago. He had thought that platinum, osmium, iridium, or some of that group, must be capable of use in this way. He used the thickness of 120, and found that it made the best filling. He used egg-shaped points for planishing. He thought the proper preparation of cavities was the great point to be gained. There was too much fear of cutting away too much. The pulp should never be exposed. Nature had built a house for it, which was better than any that art could build. Cut down to the solid tissues and saturate with thymol, which said, "peace, be still," to all the little hellyons in there.

Prof. Judd said that he could not work as well with smooth points as with the serrated, because the instrument, if not placed perpendicular, will slip. If the sharp edge was used, it would accomplish the same as the serrated instruments. He had also used planishing points, and they had worked well in his hands. He had used platinum foil. That was heavier than gold foil. This was coated with gold to secure its cohesive properties. It looked like gold before finishing, but afterwards, like an uneven mixture of the two metals.

Dr. McQuillen endeavored to impress the Association with

the great importance of using magnifying glasses in the examination of teeth.

Dr. Taft endorsed what Dr. McQuillen had said in reference to the use of glasses. He exhibited a glass which he had had made, and he thought, instead of injuring his eyes, it had improved them.

Dr. Francis also endorsed what had been said on the use of glasses. He always advocated the cutting of fine fissures. It was a dangerous practice to cut through to the pulp.

Dr. Crouse did not lay so much stress on the use of glasses, except where the man's sight had failed. He thought thorough examinations should be made, and all the appliances should be used for that purpose, the rubber dam especially.

Dr. Morgan endorsed all that had been said in reference to the thorough examination of the teeth and cutting out fissures, especially in molars. He thought heavy foils could be planished down very perfectly.

Dr. Francis advocated the use of rubber dam. In reference to the use of glasses, he related a case in which he could not detect any evidence of decay, and the fissure was not at all apparent. He opened it and found an immense cavity.

Dr. Dickerman advocated smooth points. He had found them very satisfactory, and could make better fillings than with pressure or the mallet.

Dr. Dutch related a case, showing the advantage of using glasses. A gentleman saw five cracks in an enamel, which others could not detect with the use of glasses. Some men had better sight than others, but the glasses would give them more information.

Dr. McDonneld thought they had not near arrived at perfection in the preparation of cavities. He fully endorsed the rubber dam, and also magnifying glasses.

Dr. Walker said that he would not practice dentistry with-

out the rubber dam. The power of the best eye could be extended by the use of glasses.

Dr. Salmon thought any one would acknowledge the benefit of the use of glasses, who recognized the value of the microscope. He also thought the rubber dam was necessary.

VOLUNTEER ESSAY

ON THE

HISTORY OF ANÆSTHESIA.

B.Y D. S. DICKERMAN.

"The useful," says an eminent dental author, "is ever liable to abuse."

"This is as true of anæsthesia, as of other things. For two reasons, it is more likely to be abused by dentists than by physicians: they perform painful operations oftener than physicians do; and though but little varied, for the time they last, they are among the most painful known to surgery."

"Nitrous oxide," he continues, "has been a plaything for three-quarters of a century, and tame lions have been used for the same purpose much longer, the use of either in this way, proving that the fools are not all yet dead."

The fact of nitrous oxide having been so long thus used illegitimately, and its having acquired the name "laughing gas," encourages the ignorant to administer it, and the fools to take it.

All this is very unfortunate. Many try to make the gas, who have no correct ideas on the subject; many more administer what they *call nitrous oxide, who have no true notions of the nature of anæsthesia, or of what they use.*

The consequences are, that often the lining membrane of the air cells are cauterized, or worse, the red globules share the same fate, and the functions of respiration are, for hours or days, almost destroyed.

The shock to the brain and nervous system, in such cases, is fearful; but as the patient usually gets away from the office before the worst symptoms manifest themselves, the dentist usually escapes censure, and the physician generally ascribes the morbid symptoms to something else.

The constitutions injured in this way, that is, by the use of impure gas, or the improper use of pure, are almost countless.

When properly prepared, and properly administered, no other anæsthetic, and indeed no other article of the materia medica, responds more promptly and uniformly to reasonable expectations: but, before its advantages can be fully realized, both the profession and public must be better educated in regard to it.

The public must learn that the use of it is not "the best joke of the season," and that it is not to be trifled with.

The profession must learn that the preparation of it requires some little chemical knowledge, and its administration a good deal of common sense.

They must learn that delirium and unconsciousness are not parts of, nor essential to, *anæsthesia.*

They must learn that nitrous oxide has no tendency to darken the red corpuscles, and that, therefore, if the complexion is darkened, they are administering impure gas, or smothering the patient.

They must learn to operate as *carefully* and deliberately, as if the patient were in his natural state.

They must learn to regard as failures many of their cases that they now report as "perfectly successful."

They must learn very much more about the function of respiration than they now know, that they may realize the deadly nature of nitric oxide, chlorine and carbonic acid when inhaled.

They must learn that the old plan of administering to the patient his own breath with the gas, is both filthy and deadly, and that all that has been written, with such administration

as a basis of observation, is valueless as authority. When all this is learned, nitrous oxide will be a blessing.

It is evident from this language, that there is now a most pressing need of instruction—of knowledge—of the true character of nitrous oxide as an agent for anæsthesia, by means of respiration.

A practical example dates the discovery, not of anæsthesia, nor of chloroform, ether, or nitrous oxide, but of *anæsthesia* by either.

Priestly discovered nitrous oxide, and it is always said, possessed a knowledge of its "*anæsthetic properties.*" But the *discovery* of a substance—which is a discovery of a distinct substance—is one thing, without the realization of anaesthesia by it.

Thus, for example, Priestly, though the discoverer of nitrous oxide, was yet not the discoverer of anæsthesia by it —simply because he did not operate it for anæsthesia—and simply because Dr. Horace Wells was the first to realize anæsthesia by it.

But this latter by itself, did not constitute any discovery in the scientific sense, either of anæsthesia or nitrous oxide, since anæsthesia had been known, from time immemorial, and nitrous oxide known from the time of Sir Humphrey Davy.

"How absurd to speak of him as the discoverer of anæsthesia."

These things we have here discriminated, have always been confounded in medical literature as so *many diverse* claims for discovery.

Anæsthsia—not, of course, such as we practice now by means of the lungs, and by gaseous and vaporous substance —was practiced at a very early era.

For this purpose, it is recorded, the Romans used a decoction of "atropa Mandragora."

It is the substance of a plant which belongs to the same genus as belladonna, and contains an alkaloid possessing active narcotic properties.

It is said to be capable of producing a prolonged sleep.

But whether anæsthesia was actually realized by it as by ether, we have no means of knowing.

"There are those," says an ancient author, "who boil the root in wine to a third part, and preserve the decoction, which they give in *want of sleep* or severe pains, and before operations with the knife, or actual cautery, *that they may not be felt.*"

Again, "if any one is to have a limb mutilated, burnt or sawn, he may drink half an ounce (of mandragora), and while he sleeps, the member may be cut off without any pain or sense."

The first attempt to realize anæsthesia by the lungs, in 1298, was by a mixture which could be placed on a sponge in hot water, and which applied to the nostrils of a patient about to undergo an operation, would produce sleep. Yet this mixture is not one regarded as realizing *anæsthesia* in any degree.

The Chinese are said to have accomplished anaesthesia by means of the fumes of burning Indian hemp.

These fumes do produce a narcotic effect, as do the fumes of the burning common puff-ball and other vegetable substances.

And for ages past these fumes have been used for stupefying bees before taking honey from the hive.

It is to be understood that the relief of pain, no matter how complete, is not the realization of anaesthesia, yet these two are perpetually confounded in common writing.

Priestly discovered nitrous oxide as he had oxygen, and was the first to administer gases and vapors for medicinal purposes, by means of the lungs.

About the inhalation of oxygen, he wrote, "I cannot help flattering myself, that in time, very great *medicinal* use will be made by the application of these different kinds of air to the animal system. Let ingenious physicians attend to this subject, and lay hold of the new handle which is presented to them."

After the discovery of Davy, the inhalation of gases, and even of ether, for medicinal purposes, was in vogue.

We know that the latter was not used to realize anæsthesia, nor any more, was the former.

This discovery, chemically, was wholly at another date, and constitutes, distinctly, another event in history by other actors, from the realization of anæsthesia by it.

Thus the inhalation of ether was employed then for the relief and alleviation of sufferings attending the latter stages of consumption, but such use of it, by no means, constituted anæsthesia by it.

Sir Humphrey Davy did no more than this with nitrous oxide, though inhaling nitrous oxide, one day, while in pain, as others were inhaling other gases, as well as oxygen and nitrous oxide, for medical purposes (then a common practice), he experienced relief of the pain.

He constructed a box or chamber, in which he inhaled the gas in measured quantities

And in writing afterwards on nitrous oxide, he says, "as nitrous oxide seems capable of destroying physical pain, it may probably be *used with advantage* during surgical operations, in which no great effusion of blood takes place."

Precisely because Davy did no more than this; he did not realize anæsthesia by nitrous oxide: that was a very different event, and by other actors many years afterwards, though men had employed it from the time of discovery up to the very day of that event, without using it for what we now call and mean anæsthesia.

The same was the case with ether.

In Davy's time, Faraday pointed out that the inhalation of the vapor of sulphuric ether produced *effects* similar to those induced by nitrous oxide, and henceforward the vapor of ether was exhibited at the lecture table side by side with nitrous oxide.

But as the event of realization of anæsthesia, by nitrous oxide, was due alone to Dr. Horace Wells, in 1844, so the

event of the realization of anæsthesia by ether was due to Morton, 1846.

The noticeable fact is, that familiar as scientific men were with lecture room experiments, with nitrous oxide and ether, it was not until after the lapse of thirty years that the transition of experiments from the lecture room to the operating theatre was made.

Anæsthesia, or the realization of insensibility to the pain of surgical operations, was never accomplished by nitrous oxide, ether nor chloroform, until Dr. Horace Wells, on December 11, 1844, became the subject of such an operation after inhaling the gas.

As to ether, Dr. Morton, never having accomplished anæsthesia, called upon Dr. Jackson for the loan of a gas-bag, and asked some advice about the best agent for producing insensibility. Dr. Jackson suggested the use of ether. Dr. Morton acted upon this hint, and was allowed to administer ether for surgical operations, on the 16th of October, 1846. Soon after, other surgical operations were performed while the patient was insensible from the inhalation of ether, and from this time the news spread rapidly to all parts of the world.

The application of ether for the relief of the pain of childbirth was first made by the late Sir James Simpson, of Edinburgh, on the 9th of January, 1847.

(CHLOROFORM.)

Mr. Samuel Guthrie, of Sacketts Harbor, N. Y., appears entitled to the honor of the discovery of chloroform, as he published an account of it in 1831, under the name of "Chloric Ether," and gave such accurate descriptions of its properties, as to leave no doubt about it.

In the *Journal of the College of Pharmacy*, in 1832, Mr. Daniel B. Smith, of Philadelphia, says of the new substance, "the action of this ether on the living system is interesting, and may hereafter render it an object of importance in com-

merce. Its flavor is delicious, and its intoxicating qualities equal to, or surpassing those of alchohol; it is a strong diffusible stimulant similar to hydrated ether, but more grateful to the taste."

Louberain, in France, who discovered it about the same time as Guthrie, called it "liquid bi-chloric ether," Liebeg, who also worked upon it, named it "liquid bi-chloride of carbon."

In the light of our present knowledge, the name that chloroform was an ether, appears somewhat strange, particularly as the word ether is derived from the Greek, *aitho, to burn*, and chloroform is not a combustible substance; and there are other scientific differences.

Chloroform is the name given it by Dumas. As with the ether and nitrous oxide, long before the first case of its use to realize anaesthesia by Simpson, chloroform was used for *medicinal* purposes.

In 1831, Prof. Ives, of New Haven, employed chloroform in a case of deficient respiration; he afterwards published the facts in Silliman's Journal.

In the same way, it was used in France and England, for the treatment of neuralgia and cancer, and also as a remedy for asthma.

Dr. Simpson's first paper on chloroform was communicated to the *Medico-Chirurgical* Society, of Edinburgh, Nov. 10, 1847.

As, to Wells was due the credit of first realizing anaesthesia by the gas, (nitrous oxide,) to Morton was due precisely the same—the realization of anaesthesia by ether. So to Simpson was due the credit of the first anaesthesia by chloroform.

This is precisely all the credit there is due at all in the case, and is not a credit for the discovery of *anæsthesia*, (since that had been known for ages) nor the credit for the *discovery* of ether, chloroform or nitrous oxide.

Neither one of them "discovered" the former, which was known for ages, nor discovered the substances.

But all were alike the first to realize anaesthesia: the one by nitrous oxide, the second by ether, the third by chloroform.

The discovery of "anæsthesia," then, as we call it, is one thing, and a different thing from that which is the *discovery* of a substance which *will* realize it, and that again, different from a discovery of the realization itself; and all, again, different from the whole thing of the claims of particular men, so that it needs this discrimination in order that we shall realize the exact truth in the case, of what has led to so much confusion *and indecision.*

Nitrous oxide stands on a very different base as an anaesthetic, from the vapors of ether or chloroform; exerting neither a sedative nor toxic or other dangerous effects, being, in fact, without any such direct influence upon the tissues or organs, as either of the above agencies exert in one way or another.

For no more than the oxygen and nitrogen of the air exerts an injurious effect upon the organs, do the same two in combination as nitrous oxide exert such effect, while on the other hand, both ether and chloroform *do* exert one effect or another upon the organs, the former especially, to the extent of cessation of the action of the heart, and hence, of the *circulation.*

In considering anaesthesia, therefore, by either of these agents, we are to consider that by nitrous oxide as a case of *privation* of atmospheric air, rather than by positive agency in the sense in which chloroform or ether are used.

REPORT

OF THE

PUBLICATION COMMITTEE.

Your Committee on Publication beg leave to submit the following report:

In accordance with a resolution of this Association at its last session, your committee conferred with the publishers of the different dental journals, and receiving the most favorable proposal for the publication of the transactions from the editors of the *Dental Register*, these gentlemen were employed to issue three hundred copies in the manner and form indicated in the instructions of the resolution referred to.

The number of copies of the last transactions has been reduced compared with those of previous years, and paper covers have been substituted for the more expensive muslin binding. In these items alone the cost has been lessened more than one hundred dollars as compared with the amount paid for publication the previous year, and by the arrangement made with the editors of the *Dental Register* the cost has been further reduced some fifty-five dollars below what it would have been if the proceedings had been published in the usual way.

The committee however, are decidedly of the opinion that the small sum saved by the experiment of last year is not commensurate to the disadvantages attending this

mode of publication—certainly not, unless the committee are residents of the place where the proceedings are published.

In expressing this opinion, the committee would not be understood as reflecting discredit upon the publishers who have had this work in charge, for they know them to be both experienced and eminently capable. But in supervising the publication of such a mass of matter as our proceedings contain, it requires the constant vigilance of the publication committee. Alterations, corrections and revisions must be constantly made, while the work is in progress. This is a difficult matter to accomplish even when the printers are most accessible, and impossible when it is done by correspondence.

The committee were not clear in their minds as to the proper treatment of the reports of the discussions. The question involved was, should these reports be published literally as reported, except in cases where the reporter had manifestly mistaken the idea of the speaker?

It has heretofore been customary to transmit this portion of the transactions to the different speakers, and from their hands it returns to the Publication Committee so remodeled and transformed as to be scarcely recognizable. In some respects your committee consider this the preferable method, as it tends to render the published transactions more complete, and gives to the discussions a more scholarly and consistent appearance. And yet this method is not entirely free from objections, as it also tends to encourage a loose and reckless style of debate upon the different topics introduced. Not being able to decide which of these methods would be promotive of the greater good to the Association, they have hit upon a compromise between the two for the present session, which they hope will be satisfactory to the Association, and will result in producing a better report of the transactions than has heretofore been made. The plan proposed is this:

At stated periods during the session, and while the subject is fresh in the memory of those who have taken part in the discussions, the reporter will read over his notes to those who had taken part therein, giving to each one an opportunity of correcting such errors as he may discover, and making such alterations as he may desire. In this way each speaker may be reported absolutely correct. And, after being again revised by the committee, the discussions may be made to present a truthful and valuable record when published, as well as a more creditable appearance as a scientific work.

In publishing the last proceedings it was the design of the committee to submit the proof sheets of the reports of the standing committees to the authors of the same for revision, and they believe in nearly every case this has been done. After these proofs have been revised by the authors, the committee believe the only alterations admissible are those of the types, and such faults in grammar as may have escaped the eye of the author. Copies of the transactions have been sent by mail to all whom the Treasurer has reported as entitled to receive them.

The committee have secured the services of Prof. T. O. Summers, an able stenographer, who made the report for 1870. In his labors of last year he has gained considerable practical experience in reporting dental discussions, and which will aid him materially in making his present report. The committee take pleasure in acknowledging the generosity of Mr. Summers in accepting this position more as a labor of love than of profit.

The charts accompanying the report on Dental Pathology were engraved at the expense of the chairman of that committee.

M. S. DEAN,
GEO. H. CUSHING, } COMMITTEE.
ISIAH FORBES,

REPORT OF THE NEWLY APPOINTED COMMITTEE

ON

MECHANICAL DENTISTRY.

The acting Committee on Mechanical Dentistry beg leave to submit the following brief report:

We are unable to report anything at this time of any practical benefit which has not been brought to the notice of the profession through the medium of journals.

The different styles of work stand in the same order they have for years. Continuous gum and gold being at the head of the list.

Then we have many so-called cheap materials which follow, each having their advocates; rubber, celluloid, pyroxyline, porcelain base, aluminum, and the alloys of tin.

Upon the superiority of either we are unable to agree.

Your committee are inclined to believe that the cause of such a demand for so called cheap bases is occasioned by the want of teeth in proper variety of shapes and styles suitable for gold work.

All of which is respectfully submitted.

W. N. MORRISON,
J. R. WALKER,
E. FLOYD,
} COMMITTEE.

Dr. Cushing, the President elect, being conducted to the chair, thanked the Association for their evidence of good feeling towards him, and said that he would endeavor to preside with impartiality and satisfaction to the Association.

Dr. Morgan, the retiring President, said—"In retiring from the position in which you have placed me, I do not propose to inflict a speech upon you at this late hour, but I feel that I would be untrue to myself and to you were I not to congratulate you on the harmony and good feeling evinced in your deliberations, and also upon the general character of the papers presented. I am deeply impressed with the fact that they would do honor to any association of this or any other country. When I contrast them with what they were a few years ago, the contrast is sensibly appreciated in the direction of improvement and development. I congratulate you upon your selection of officers. I have no doubt your President will fill his place with more dignity and fewer blunders than your humble servant. This institution has exerted a powerful influence for good upon our profession. A few years ago, and it seems but a short time to me, I was present, with some others, at Washington, where this association was organized. Since that time, local societies have been established, and a liberal spirit cultivated in the profession; and though it is denied by many that the American Dental Association is paramount authority in this profession, yet it has exerted a mighty influence. The future is bright before us. If in the last ten years, under so many disadvantages, we have progressed so far, and accomplished so much, what will we have done during the ten years to come, if we go on as we have begun. It will be a matter of great pride to those who were present at its organization to refer to this. I am glad to see so many gray hairs here. It stimulates me, and inspires me with high hopes for the future. I again tender to you my congratulations and thanks."

TRANSACTIONS

OF THE

American Dental Association,

AT THE

TWELFTH ANNUAL SESSION,

HELD AT NIAGARA FALLS.

COMMENCING AUGUST 6TH, 1872.

PUBLICATION COMMITTEE.

M. S. DEAN, GEO. H. CUSHING,
S. H. McCALL.

PROF. T. O. SUMMERS, A.M., M.D.
REPORTER OF DISCUSSIONS.

BOSTON MEDICAL
AUG 7 1903
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The AMERICAN DENTAL ASSOCIATION, although formally accepting and publishing the reports of the various Standing Committees, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

CATALOGUED
AUG 7 1903
J. F. B.

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MINUTES

OF

TRANSACTIONS.

By M. S. Dean, Secretary

Niagara Falls, August 6, 1872.

The American Dental Association commenced its Twelfth Annual Session, Tuesday Morning, at 10½ o'clock. The President, G. H. Cushing, in the chair.

The Session was opened by prayer by the Rev. Mr. Doggett.

On calling the roll of those who had paid their dues for the year 1872, the following named qualified members were present:

W. H. Goddard,	Louisville, Ky.
S. A. Freeman,	Buffalo, N. Y.
S. B. Palmer,	Syracuse, N. Y.
B. T. Spellman,	Detroit, Mich.
W. H. Atkinson,	New York City.
J. N. Crouse,	Chicago, Ill.
S. H. McCall,	Binghampton, N. Y.
M. S. Dean,	Chicago, Ill.
Geo. W. Keely,	Oxford, O.
Isaiah Forbes,	St. Louis, Mo.
Jas. McManus,	Hartford, Conn.
C. E. Francis,	New York City.

W. H. Morgan,	Nashville, Tenn.
C. W. Stainton,	Lancaster, N. Y.
J. F. Canine,	Louisville, Ky.
Geo. H. Cushing,	Chicago, Ill.
O. C. White,	Hopkingston, Mass.
E. R. E. Carpenter,	Chicago, Ill.
Wm. Dutch,	San Francisco, Cal.
S. B. Noble,	Chicago, Ill.
E. S. Holmes,	Grand Rapids, Mich.
G. B. Daboll,	Buffalo, N. Y.
H. A. Smith,	Cincinnati, O.
H. L. Sage,	Bridgeport, Conn.
S. B. Noble,	Washington, D. C.
J. J. Anderson,	Springfield, Mass.
J. Taft,	Cincinnati, O.
G. B. McDonneld,	Coneautville, Pa.
F. S. Whitslar,	Youngstown, O.
L. D. Shepard,	Boston, Mass.
Will. Taft,	Cincinnati, O.
M. H. Webb,	Lancaster, Pa.
J. H. McQuillen,	Philadelphia, Pa.
S. M. Cummings,	Elkhart, Ind.
Frank Abbott,	New York City.
I. J. Wetherbee,	Boston, Mass.
D. S. Dickerman,	Taunton, Mass.
Thos. T. Moore,	Columbia, S. C.

The following permanent members, being absent, forwarded their annual dues:

J. S. Knapp,	New Orleans, La.
Chas. E. Dunn,	Louisville, Ky.
F. Peabody,	Louisville, Ky.
W. H. Shadoan,	Louisville, Ky.
C. F. Wheeler,	Albany, N. Y.
A. E. Lyman,	Warren, O.
S. W. Dennis,	San Francisco, Cal.
J. J. Birge,	San Francisco, Cal.
G. B. Harriman	Boston, Mass.
Chas. Merritt,	New York City.

Chas. D. Cook, . . . Brooklyn, N. Y.
W. W. Allport, . . . Chicago, Ill.

The minutes of the last annual meeting were read and approved.

Dr. Taft moved the suspension of the rules for the purpose of allowing the Committee on Credentials to make their report.*

The Committee on Credentials report the following named persons as qualified delegates from their respective societies, viz:

American Academy of Dental Science—L. D. Shepard.
Brooklyn Dental Society—C. H. Biddle, John C. Wyman, W. H. Atkinson, R. R. McGregor, G. A Mills.
California State Dental Association—H. H. Pierson, S. E. Knowles, Wm. Dutch.
Chicago Dental Society—M. S. Dean, A. W. Freeman, A. W. Harlan.
Connecticut State Dental Association—Dan'l Dwyer, C. Fones.
Connecticut Valley Dental Association—G. F. Harwood, B. M. Pevey.
Forest City Society of Dental Surgeons—H. L. Ambler, Corydon Palmer.
Illinois State Dental Society—Geo. H. Cushing, E. R. E. Carpenter, J. N. Crouse, E. Honsinger, D. P. Freeman, S. B Noble, W. C. Dyer, E. F. Davis, J. A. W. Davis.
Indiana State Dental Association—Seneca B. Brown.
Kentucky State Dental Association—W. H. Goddard, J. F. Carine, B. Oscar Doyle.
Lake Erie Dental Association—G. B. McDonneld, C. D. Elliot, George Elliot, F. Herrick.
Massachusetts Dental Society—Geo. F. Waters, I. J. Wetherbee, Edward Page, I. A. Salmon.
Mad River Valley Dental Association—C. Bradley.

* Partial reports were made from time to time by this Committee, but for convenience to the reader we here insert the "Final Report," which embodies the whole.—PUB. COM.

Mississippi Valley Dental Association—D. W. Clancey, J. W. Baxter, E. Osmond, A. F. Emminger.

Missouri State Dental Association—Isaiah Forbes, W. H. Eames, Homer Judd.

New Jersey State Dental Society—A. A. Pierce, W. Pinney.

6th District Dental Society, New York—S. H. McCall, F. B. Darby, A. D. Turner, F. M. Snook, G. W. Melotte, A. M. Holmes.

8th District Dental Society, New York—M. B. Straight, S. S. Southworth, Chas. W. Stainton, John A. Straight, W. C. Barrett.

Odontological Society of Pennsylvania—J. H. McQuillen, C. N. Peirce, Louis Jack, C. J. Essig, J. L. Eisenburg.

Odontological Society of New York—Chas. E. Francis, W. E. Hoag.

Ohio State Dental Society—J. W. Lyder, W. M. Herriott, E. J. Waye.

Ontario Dental Society—F. G. Callender, J. B. Wilmott, C. S. Chittenden.

Pennsylvania Association of Dental Surgery—J. H. Githens, Amos Wert, James Truman, Spencer Roberts.

Pennsylvania State Dental Society—E. M. Pierce, E. R. Allen, J. L. Hill, H. W. Arthur, G. W. Klump.

Boston Dental College—D. S. Dickerman.

Dental School of Harvard University—Theo. B. Hitchcock.

N. Y. College of Dentistry—Frank Abbott.

Pennsylvania College of Dental Surgery—T. L. Buckingham.

Philadelphia Dental College—D. D. Smith.

St. Louis Dental Society—W. N. Morrison.

South Carolina State Dental Association—W. S. Brown.

Wisconsin State Dental Society—Edgar Palmer.

On motion of Dr. Taft, it was resolved the Committee on Credentials hereafter make special inquiries as to the wish of delegates in regard to becoming permanent members.

Prof. McQuillen moved that the vacancy which appears in the minutes of the Standing Committee on Dental Literature be filled. The question was referred to the Committee on Nominations.

On motion, the rules of order were suspended, and the report of the Publication Committee read by the chairman of that committee, as follows:

Mr. President:

Your Committee on Publication beg leave to submit the following:

They employed a stenographer to report the discussions of the last annual meeting of this Association, for the sum of one hundred dollars.

These reports had been duly revised, together with the essays, and reports of the Standing Committees, and their publication was nearly completed on the 7th of Oct. last, and would have been distributed to the members, as early as the middle of that month, had they not met the common fate that befel a great portion of the city of Chicago on the 9th. Your Committee were highly gratified by the despatch with which the Transactions had been printed, and their typographical elegance, which they considered a marked improvement upon the issues of previous years. All the matter had gone to press, save one form, which was in the hands of the printers. These were all consumed with the publishing house. But, the Chairman of your Committee, at a time when both the heavens and earth seemed on fire, succeeded in rescuing the most of the *copy* of the Transactions. The Reports of Profs. Judd and Atkinson, on Physiology and Pathology, have been reproduced respectively by the kindness of their authors, and the Committee are happy to be able to say that the only paper now missing is the voluntary essay on the Formation of the Teeth, by Dr. Harriman.

A small portion of the reports of discussions is missing.

The Committee had corresponded with the reporter, in the hope that this hiatus might be filled, but in this were disappointed.

The Committee have collected and re-arranged the proceedings, so that the Transactions for the year 1871, when published, will be found to be nearly complete.

A considerable time had elapsed before this could be accomplished, and then, the facilities for publishing were not such as to ensure their issue but a short time before the present meeting.

The Committee, therefore, with the advice of some prominent members and officers of the Association, thought it best to postpone their publication, and recommend them to be included in the volume for the year 1872.

Although great efforts were made to save the property of the Association, the Book of Records, as well as the published Transactions for the years '69 and 70, which were in the Committee's possession, were destroyed; the book containing the Constitution, and the signatures of the members thereto, is safe.

A new Book of Records has been procured, and the minutes taken from the printed Transactions have been partially transcribed therein, and will be completed before the book leaves the hands of the present Secretary, from the organization of the convention at Niagara, up to the last session of the Association, inclusive, so that the Association will find its Transactions and Records very nearly complete in every respect.

The Committee are happy to state that they have secured the services of Prof. Summers to report the discussions of the present session, for the small sum of one hundred dollars.

M. S. DEAN,
Chairman Pub. Com.

On motion of Dr. Morgan, the report was accepted, and its suggestions approved.

S. B. Palmer, Chairman of the Committee of Arrangements, made the following report:

Your Committee would report that the subject of local anæsthesia has been presented, with the request that it might come before the Association.

Dr. A. T. Smith, of Syracuse, N. Y., formerly a dentist in Syracuse, who has retired from practice, has been simply employed by the parties interested in this invention, to present its merits, by its application before this body, if cases can be obtained for that purpose.

Your Commitee are well aware of the objections of the Association, to the admission of anything connected with patents; for that reason, they have taken pains to make this plain statement of the whole matter, which is this: The subject of local anæs-

thesia has been presented to the Committee under the above named circumstance; it is for the Association to receive or reject a hearing in its behalf.

Dr. Jack spoke forcibly in opposition to allowing an article, the ingredients of which were not made known to the profession, to be presented for discussion in this Association.

On motion, the application was unanimously rejected.

The Committee on Physiology was called, and further time granted.

The Committee on Dental Pathology and Surgery was called.

After making a few explanatory remarks as to the particular branch of the subject which he had taken up—Ætiology—in which he stated that before this report was written he was not aware that a committee had been appointed upon that special branch, the report was read by Dr. Judd.

On motion, the rules were suspended, and the following report of the Committee of Arrangements was made by Dr. Palmer.

Your Committee would respectfully report that they have made such arrangements for the sessions of this meeting, as seemed for the interest of the Association. After repeated consultations and investigations, your Committee have secured Grant Hall, as a place for holding these sessions. While it is well known that it has some serious objections—taking into account the conveniencies and rooms connected therewith, which are indispensible, for use of committees, appliances, &c., not attainable elsewhere, has influenced the Committee in this direction.

They have also accepted the kind offer of Dr. Southworth, of his office, on the floor below, for the use of clinical, and such other accommodations as he can render this body.

Room No. 12, on the floor below, is open for dental appliances.

One chair from the Buffalo Dental Manufacturing Co., and

one from R. W. Archer, of Rochester, have been furnished for the use of members during the meeting.

Your Committee would recommend, for the daily order of exercises, viz.:

Clinics and exhibition of appliances, on Wednesday and Friday mornings, from 8 to 10 o'clock.

Morning sessions from 10 o'clock A.M. to 2½ P.M.

Afternoon sessions from 4 to 8 o'clock.

No session on Wednesday afternoon.

On motion of Dr. McQuillen, so much of the report as referred to the order of business, was amended, making the hours of meeting of the Association from 10 A.M. to 3 P.M. and from 8 o'clock in the evening, *ad libitum.*

Dr. Taft offered the following, which was adopted:

WHEREAS, misunderstandings have arisen, by members, in regard to arrears for dues, therefore

Resolved—That while the Association approves of the action of the Treasurer, in collecting such dues, and considers the claims for unpaid dues still valid, it hereby instructs the Treasurer to cancel all unpaid dues of members, which may have accrued prior to the adoption of the amended Constitution, including the year 1869.

On motion of Dr. Shepard, "Resolved—That hereafter no person shall be received as a delegate, who is in arrears for dues."

Discussed by Shepard, Morgan, Osmond, Crouse, Francis, and others. The motion prevailed.

The vote was reconsidered and amended to read as follows: "Henceforth no person shall be received as a delegate, who is in arrears for dues, or until they have paid to the Treasurer the full amount due at the time their names were dropped for non-payment."

On motion, the rules were suspended in order that the Treasurer might read the list of members, and the amount

of their dues. The regular order of business, Dental Pathology and Surgery, was resumed and discussed by Profs. Atkinson, Judd, and McQuillen.

At a meeting of the Executive Committee, vacancies in that committee were filled, as follows:

2d Division—W. H. Morgan.
3d Division—L. D. Shepard, S. H. McCall, B. T. Spellman,

Dr. Crouse moved a suspension of the rules, for the purpose of filling vacancies in Standing Committees. The matter was referred to the Nominating Committee.

Committee on Credentials made a supplementary report, which was adopted.

Adjourned.

FIRST DAY—EVENING SESSION.

Association convened at 8 o'clock. The President in the chair.

The minutes were read and approved.

The Committee on Nominations, through Dr. Taft, reported the following names to fill vacancies in standing committees:

Histology and Microscopy—J. H. McQuillen and J. Taft.
Dental Chemistry—T. L. Buckingham.
Dental Therapeutics—C. R. Butler.
Mechanical Dentistry—J. Allen and J. F. Canine.
Dental Literature—C. N. Peirce and H. Judd.
Dental Education—W. H. Morgan, L. D. Shepard, and H. Judd.

On vote, the nominees were elected.

The discussions on the subject of Pathology and Surgery

were suspended until the additional report upon that subject was presented.

Prof. Atkinson delivered this report in a partly written and partly verbal form, which occupied the balance of the evening session.

The following were appointed clinical operators for tomorrow morning: Drs. Mills, Atkinson, Crouse, and Carroll.

Adjourned.

SECOND DAY—MORNING SESSION

Association convened at 10½ o'clock, President in the chair.

Minutes read and approved.

Discussions on Pathology and Surgery announced, by the President, in order. No one desiring to discuss the subject further, it was passed.

The Committee on Histology and Microscopy was called, and further time granted.

Committee on Dental Chemistry called, and report read by the chairman, Dr. Dickerman.

Discussion followed by Drs. Buckingham, Summers, McQuillen, Bogue, and Atkinson.

On motion of Dr. Atkinson, a vote of thanks was tendered to Prof. Summers for the able and lucid manner in which he had addressed the Association on the subject of Chemistry, and he was requested to prepare the same for publication in our Transactions.

Dr. McQuillen supported the resolution, considering it very appropriate in the present case, as Prof. Summers was not a member of the profession; but disapproved, most decidedly, of its being made a precedent, to be applied as

complimentary to essays or other praiseworthy productions which might be presented by members of the Association.

On motion, the rules of order were suspended for ten minutes, for miscellaneous business.

Dr. Peirce, of Philadelphia, offered the following:

WHEREAS, the Declaration of Independence of the United States of America was prepared, signed and promulgated in the year 1776, in the city of Philadelphia. And

WHEREAS, the people of the United States having decided to celebrate, by appropriate ceremonies, the Centennial Anniversary of this memorable and decisive event, and Congress has, by appropriate legislation, appointed a Commission, whose duty it is to prepare and superintend the execution of a plan for holding this exhibition; and the Commission in session in Philadelphia has expressed the desire that statistics shall be collected, relating to all matters that shall indicate the progress this country has made in the first century of its existence;

And that all associations, Religious, Educational, Industrial, &c., shall take such measures as will make the statistical department of the exhibition of 1876 as complete as possible: therefore,

Resolved—That this Associations, now in session, shall appoint a committe of eleven, whose duty it shall be to prepare and present to this Commission, such a report of our profession, as, in their judgment, is consistent with the results of our efforts for the improvement of the physical, intellectual and moral condition of man.

The resolution was adopted, and the appointment of said committees referred to the Executive Committee.

This committee subsequently reported the following nominations: C. N. Peirce and Louis Jack, Philadelphia, Pa.; C. E. Francis, New York; L. D. Shepard, Boston; J. Taft, Cincinnati; H. Judd, St. Louis; G. H. Cushing, Chicago; W. H. Morgan, Nashville; J. S. Knapp, New Orleans; S. H. Noble, Washington; Wm. Dutch, San Francisco. On vote

of the Association, they were unanimously elected as the committee referred to in the above resolution.

Dr. Shepard, in behalf of the Committee on Credentials, made a supplementary report, which was adopted.

Dr. Shepard offered the following, which was adopted:

Resolved—That the Treasurer be, and hereby is, authorized to procure such blank notices and other printed matter as will facilitate him in the performance of his duties.

The Committee on Dental Therapeutics was called, and the chairman, Dr. Sage, read the report.

Discussed by Drs. Truman, Butler, Wetherbee, Crouse and Thomas.

Adjourned.

SECOND DAY—EVENING SESSION

The Association met pursuant to adjournment. The President in the chair.

The minutes of the preceding session read and approved.

The subject of Dental Therapeutics was continued and discussed by Drs. Carroll and Bogue.

On motion of Dr. Morgan, the further discussion of Therapeutics was postponed, and the subject of Dental Physiology taken up.

The subject was opened by a brief written report by Dr. Dean, and continued by the chairman, Prof. McQuillen, verbally, illustrating the subject by numerous specimens of comparative anatomy.

Discussion followed by Profs. Pierce, McQuillen, and Dr. Allen.

Adjourned.

THIRD DAY—MORNING SESSION.

Association convened at the usual hour. The President in the chair.

Minutes of the previous session read and approved.

Dr. Truman, of Philadelphia, offered the following, which were adopted:

WHEREAS, The American Dental Association, at a meeting held July, 1864, used the following language, in resolutions then offered:

"WHEREAS, Dr. Horace Wells, of Hartford, Connecticut, in the year 1844, did introduce to the public in his practice of dental surgery, nitrous oxide gas as an anæsthetic for the painless extraction of teeth, and

"WHEREAS, Nitrous oxide gas, as exhibited by Horace Wells, proved absolutely successful, as is confirmed by abundant documentary evidence at hand, clearly setting forth his claims as the first to bring to public notice, any agent producing anæsthesia; therefore be it

"*Resolved*, By the American Dental Association, that to Horace Wells, of Hartford, Connecticut, (now deceased), belongs the credit and honor of the introduction of anæsthesia in the United States of America; and we do firmly protest against the injustice done to truth and the memory of Dr. Horace Wells, in the effort made during a series of years, and especially at the last session of Congress, to award the credit to other person or persons." And

WHEREAS, While desiring to re-affirm our belief in the indisputable character of the evidence, upon which this discovery is claimed for Dr. Horace Wells, we are also forced to believe that the dental and medical professions have neglected a plain duty in failing to give some substantial evidence of their appreciation of the inestimable value this discovery has been to the world, and of the estimation with which they hold the memory of the discoverer. And

WHEREAS, We have been informed that the family of Dr. Horace Wells were left wholly unprovided for, and have struggled through the twenty-eight years that have elapsed since the discovery was made: We therefore recognize the bounden obligation we are under, even at this late day, to recompense them for the labors of the husband and father. Therefore, be it

Resolved, That this Association most cordially approves of the efforts now being made, in the dental and medical professions, to raise a fund, to be known as "The Wells National Testimonial Fund." And it would earnestly ask the co-operation of all dental associations in the country, to forward this work; and would also impress every individual member of the profession with the importance of doing all in his power to make this, not only a credit to his profession and a substantial gift to the family of Horace Wells, but an honor to the memory of one of the greatest of the world's benefactors.

Physiology was re-called and discussed by Judd, Trueman, Wetherbee, Bogue, McQuillen, Butler and Hitchcock.

On motion of Dr. Moore, the subject was passed.

The report on Operative Dentistry called and read by the chairman of that committee, C. E. Francis.

Dr. Shepard made an additional report upon a special department of the same subject.

On motion, a recess of ten minutes was granted.

Operative Dentistry resumed and discussed by Dr. Noble, of Washington, Frank Abbott, Crouse, Wetherbee, Butler, Moore, Bogue and Shepard.

Adjourned.

THIRD DAY—EVENING SESSION.

The Association convened at 8¼ o'clock. The President in the chair.

Minutes read and approved.

On motion, it was resolved that when we do adjourn, it be to meet at 9 o'clock to-morrow morning.

Dr. Shepard moved that the regular order of business be suspended at 10 o'clock this evening, for the special purpose of electing officers for the ensuing year.

On motion of Dr. Truman, the resolution was amended so as to include all miscellaneous business. Carried.

On motion of Dr. Truman, Resolved—That 12 o'clock M. to-morrow, be the hour of final adjournment.

On motion of Dr. Taft, 10 o'clock P. M. was substituted for 12 M. Carried.

On a motion of Dr. Francis, as amended by Dr. Taft, Resolved—That discussion be continued on the subject of Operative Dentistry, until it be finally passed, and that each speaker be limited to 10 minutes.

Discussion ensued—Drs. Atkinson, Judd, Palmer, Thomas, Wetherbee, Shepard, Southworth, Truman, Abbott, Eams.

At 10 o'clock, the special order of business, as provided for, was taken up, and, upon ballot, Put-in-Bay was selected as the next place of meeting.

The chair decided that none but permanent members were eligible to office. An appeal was taken, and the chair sustained.

The chair decided that delegates who were not permanent members were voters. An appeal being taken the chair sustained.

Upon second ballot, the following officers were elected:

President—P. G. C. HUNT.
1*st Vice-President*—L. D. SHEPARD.
2*d Vice-President*—G. A. MILLS.

Corresponding Secretary—J. TAFT.
Recording Secretary—M. S. DEAN.
Treasurer—W. H. GODDARD.

On motion of Dr. Francis, Resolved—That the first o
be the receiving of the Reports of Standing Commit
and to be continued until all the reports are received.

W. H. GODDARD, TREASURER, *in account with* AMER
DENTAL ASSOCIATION.

Dr. August, 1871.	To Balance from 1870	$20
	To Cash, Dues, 1869	1
	To " " 1860	3
	To " " 1871	39
		$64

Cr. August, 1871.	By Paid Voucher, No. 1	$50
	" " No. 2	50
	" " No. 3	25
	" " No. 4	20 00
	" " No. 5	100 00
	" " No. 6	17 07
	" " No. 7	2 00
	" " No. 8	22 35
	Balance Cash in my hands	358 63
		$645 05

Respectfully submitted,

Wm. H. GODDARD.

NIAGARA, August, 1872.

We have examined the Treasurer's Report and find the same correct.

L. D. SHEPARD,
S. H. McCALL,
B. T. SPELLMAN,
} COMMITTEE.

FOURTH DAY—MORNING SESSION.

lowing were elected members of the

Executive Committee—

D. Shepard, H. A. Smith, and S. H. McCall.

e should have appeared in the list of Elected Officers, page 24, tted through mistake in publishing.]

sociation convened at 10 o'clock. Vice-President, is, in the chair.

s of the previous meeting read and approved.

Committee on Dental Education was called. No

ecial committee appointed to prepare a circular on Education, was called, and further time granted.

port on Dental Education was called for, and pre- y Prof. Shepard.

On motion of Dr. Judd, the rules were suspended, and P. G. C. Hunt, the President elect, inducted in office.

Profs. Atkinson and Judd were appointed to conduct the gentleman to the chair.

Prof. Shepard asked the privilege of correcting the impression which prevailed to some extent, that he was interested in the Rubber Company. This he denied in the most emphatic manner.

Discussion on Dental Education was announced in order, and the subject discussed by Drs. Atkinson, McQuillen, Mills, Dickerman, Buckingham, Jack, Abbott, Judd and Crouse.

On motion, the subject of Dental Education was passed.

Moved to suspend the rules for the purpose of admitting Dr. Jack's resolutions. Carried.

The following was then offered by Dr. Jack, and prevailed:

"*Resolved*, That the Committee on Dental Education be instructed to procure the evidence of any dental institution having given diplomas for a mere pecuniary consideration, that such institution, so called, may be excluded from representation, and also that said committee be instructed to procure, as far as attainable, a list of those who have in this manner procured either a medical or dental diploma, with the view that in the future such persons may not be admitted to this body."

Dr. S. B. Palmer, Chairman of the Committee of Arrangements, made a report, and presented bills of indebtedness of the Association, which was approved, and the account as set forth in the report, ordered paid.

AMERICAN DENTAL ASSOCIATION to EXECUTIVE COMMITTEE.

Dr. To Rent of Hall, four days at $10	$40 00
" " three evenings at $5	15 00
Janitor's Services, &c.	10 50
Express on Chairs	5 00
Stationery, &c.	2 50
Rent for one evening, gas, &c.	5 00
Janitor	75
	$78 75

S. B. PALMER,
J. B. McDONNELD,
A. B. ROBINS,
} COMMITTEE.

The Committee on Credentials presented their final report, which was adopted. (See page 11.)

The rules were suspended in order that Dr. Honsinger might give notice of a proposed amendment to the Constitution, as follows:

"ART. 3. Sec. 3.—MEMBERS TO BE OF TWO CLASSES.—The members of this Association shall be of two classes, delegates and permanent members, having equal rights and privileges, except eligibility to office, none being eligible but those who, upon signing the constitution and paying their dues, shall declare their intention of becoming permanent members."

The report on Dental Education was called for.

Dr. Crouse, the newly appointed chairman of that Committee, apologized for not having a written report, but made a brief verbal one.

Discussion followed by Drs. Buckingham, McDonneld and Crouse.

Dr. Jack read a brief paper entitled "An Appeal to the Dental Profession."

On motion of Prof. Buckingham, Dr. Jack was requested to prepare a paper for publication in the Transactions, explanatory of Dr. Arthur's method of treatment of caries in teeth.

On motion, the subject of Dental Literature passed, and that of Dental Ætiology taken up.

Dr. Thomas, a member on that committee, read a report.

On motion, the subject was passed.

The Committee on Histology and Microscopy was called, and report read by Prof. McQuillen, and the subject discussed by Profs. Shepard, Judd, McQuillen and Taft.

On motion of Dr. Taft, the order of business was suspended to hear a report of the Executive Committee. (See page 19.)

On motion, the salaries of the Treasurer and Secretary were ordered paid.

Dr. Taft offered the following, Resolved—That a committee of three be appointed to prepare a representative

expression of the sense of this Association upon the general use of anæsthetics in dental practice. Carried.

The chair appointed Drs. Taft, McDonneld and W. N. Morrison.

Dr. Taft offered the following, which was adopted:

RESOLUTIONS OF THANKS TO DR. S. S. WHITE.

"WHEREAS, Dr. S. S. White, by his self-sacrificing, and yet conservative action, has secured and preserved about all that seems to be left, in the way of evidence, against the validity of the "Cumming's Patent," that may be employed with any hope of success by the dental profession, in a contest with the Dental Vulcanite Company.

"The indications are, that had he been free to act, there was a possibility, and perhaps a strong probability. that a very different result would have been attained by the litigation; knowing as he did, much of the duplicity and rascality of the plot, but yet not enough to warrant a public announcement.

"For his efforts to save the members of the profession from active co-operation in, and money contributions to this swindle, he has received censure and recrimination from those he endeavored to save from defeat and involvement, therefore,

"*Resolved*, That to him is due the thanks of this Association, for the course he has pursued and the efforts he has made, in in this cause, which have an embodiment in the *expose* he has made of the whole scheme and transaction in the June number of the *Dental Cosmos*.

"For all this he is entitled to and receives our entire approbation, appreciation and regard."

H. A. Smith offered the following:

"WHEREAS, In our opinion some organized plan of opposition to the absurd demands of the Vulcanite Company is demanded,

"*Resolved*, That a Committee of five be appointed to perfect such plan of organization of the dental profession, and that they confer with all dental societies."

Adopted, and the following committee appointed by the chair: H. A. Smith, L. Jack, G. H. Cushing, H. Judd and J. Taft.

Dr. Shepard offered the following:

"*Resolved*, That the chairmen of the Publication Committees of 1865, 1866, 1867, 1868 and 1869, are instructed to forward to the Treasurer all the copies of Transactions of the above years in their possession, and that the Treasurer distribute the same to members entitled to them, and sell them to applicants at the prices voted by the Association at the session of 1870."

Adopted.

The following resolutions were offered by G. B. McDonneld, Chairman of Committee of Arrangements:

"*Resolved*, That this Association tender a vote of thanks to Dr. S. L. Southworth, Dentist, of this place, for the many favors he has conferred on us, in furnishing the free use of his rooms for clinical exercises, and exhibition of appliances, the reduction of fares to Goat Island and Suspension Bridge, and the kindly interest he has taken in our welfare and comfort during our stay here. May his shadow never grow less.

"*Resolved*, That this Association tender a vote of thanks to the Buffalo Dental Manufacturing Company, and R. W. Archer, of Rochester, for the prompt manner in which they answered the call for dental chairs for the use of this Association."

The following resolution, by Dr. McQuillen, was adopted:

"*Resolved*, That this Association meet in Philadelphia, at the usual period of the year in 1876, and that the Corresponding Secretary be instructed to open correspondence with foreign dental societies, inviting them to send representatives to this organization at that time."

Upon motion, Dr. J. H. McQuillen was elected to assist the Corresponding Secretary in this duty, but subsequently, at his request, was excused from acting.

Notice of proposed amendments to the constitution were given, as follows:

Amend Section 4, Article III., by adding to it, after the last word—body—the following: "but no person having once been a permanent member of this Association, and having been dropped from the roll for the non-payment of dues, shall afterwards be received as a delegate, until he shall have paid to the Treasurer, the full amount which was due from him, up to the time he was so dropped."

Amend Article IX., by substituting, "Alterations and amendments may be made in the foregoing Articles or Rules of Order, at any annual meeting, by the consent of all the members present. Otherwise, notification in writing shall be made of any such proposed alterations or amendments, and laid over for one year for final action, when they can only be adopted by an affirmative vote of two thirds of the members present."

Amend Article VI., Section 1, by adding, in the proper place, the following:—"A Committee on Ætiology."

Amend Article V., Section 1, by adding the following, viz.:—"No person shall be eligible to office or to serve on any standing committee in this Association, who has not been a permanent member for at least one year preceding his election or appointment. Nor shall any, except permanent members, be allowed to vote for officers, or as to the appointment of committees, or as to the disposal of funds."

Amend Article VI., Section 1, by adding the following:

"The above Standing Committees shall be appointed in the following manner, viz.:

"The Chairman of each committee shall be appointed for the term of three years, and shall be selected, with especial reference to his qualifications and willingness to serve upon such committee. The other two members shall each be elected for the term of one year; also with reference to their fitness for the particular work required of them. The manner of their election shall be as follows, viz.:—Upon the report of the Executive Committee, of names for the standing committees, the question

shall be, 'Will the Association now confirm the nominations of the Executive Committee?' Any member may call for a separation of the question, by leaving out a part of the nominations, while the other is confirmed; and when such division is made, the report, so far as not adopted, shall be re-committed to the Executive Committee, with instructions. Nominations shall be made only through the Committee, as they are supposed to be better qualified to judge of the fitness of members for various works—as well as to have acquainted themselves in some measure, with the facts as to their willingness or otherwise—to serve the Association in such capacities."

Amend Article III., Section 3, by adding, "except as provided in Section 1, Article V."

Amend Article V., Section 1, by changing the word "two"—the first word on 3d line from top of page 5—to "three," and the word "three"—the last word on same line and same page—to "four."

Amend Article V., Section 6, under head "Sub-Committees, 1st Division," by introducing between the first and second sentences the following sentence: "They shall also report to the Association, upon any and all appliances which may be placed in their hands."

Adjourned.

FOURTH DAY—EVENING SESSION.

Association convened at 8½ o'clock. President Hunt in the chair.

The minutes of the previous meeting read and approved.

Dr. Cushing moved a suspension of the rules, in order that the Committee on Nominations might make their report.

Prof. Taft presented the nominations of the following

STANDING COMMITTEES :

Physiology—M. S. Dean, C. E. Francis, R. G. Thomas.

Pathology and Surgery—H. Judd, H. S. Chase, J. B. Coolidge.

Histology and Microscopy—T. B. Hitchcock, E. C. Latimer.

Chemistry—W. C. Adams, M. H. Webb, H. A. Smith.

Therapeutics—H. L. Sage, J. McManus, L. Jack.

Operative Dentistry—L. D. Shepard, F. Abbott, I. A. Salmon.

Mechanical Dentistry—D. D. Smith, W. H. Eames, W. H. Herriott.

Education—W. H. Morgan, E. J. Waye, S. H. McCall.

Dental Literature—G. H. Cushing, E. A. Bogue, C. N. Peirce.

Ætiology—W. W. Allport, P. G. C. Hunt, S. B. Brown.

Prize Essays—W. H. Goddard, J. F. Canine, W. Dutch.

On vote of the Association, the nominations were confirmed.

The committee, through the chairman, Dr. Taft, made a report on the subject of Anæsthetics, which was so amended as to read as follows, and adopted.

"Your committee, appointed to draft a resolution expressive of the sense of this Association upon the general use of Anæsthetics in dental practice, would report

"That in view of the fact that danger attends the administration of the ordinary anæsthetics, especially chloroform and nitrous oxide, particularly if the agents are impure; very few indeed beiug able to determine this fact, or make proper tests; and death having occurred in a sufficient number of cases (from the exhibition of these agents) to render their general use of very doubtful propriety; and in a far greater number of cases, more or less serious results have been experienced from its use.

"And in addition to this, it is but too well known that

these agents are made instrumental in the accomplishment of a large amount of unprofessional and mischievous practice, by affording facility of doing that which could not be done without.

"We would, therefore, most earnestly recommend, to the dental profession the abandonment of general anæsthetics in ordinary practice, and to resort to them only under the most urgent circumstances, or still better, as the custom of some is, refrain from using them altogether.

J. TAFT.
G. B. McDONNELD.
W. N. MORRISON."

On motion of Dr. Taft, the following report was adopted:

NIAGARA FALLS, Aug. 9, 1872.

The committee, to consider what action should be now taken, would report that we recommend the appointment of a committee of five, who shall co-operate with Dr. S. S. White, and have full discretionary power to devise means and act in the defense of the interests of the dental profession, against the unjust demands of the Dental Vulcanite Company.

On motion, the regular order of business was called.

Dr. Allen read the report of the Committee on Mechanical Dentistry.

The subject was discussed briefly by Dr. Allen. Subject passed.

The Committee (special) on Local Societies and Conference with the Profession, was called.

Dr. Dutch made a brief verbal report in reference to the status of local societies in California, on which he spoke encouragingly as to the future.

Dr. Taft also reported that he had, during the past year, visited at least twenty societies, and had been more than compensated for the time thus spent. Societies were attaining a higher grade of organization and activity and useful-

ness. He urged the importance of re-appointing this committee.

The amendment to the constitution, as proposed by Dr. Goddard, last year, was brought up. After discussion, lost.

The Committee to act with S. S. White, in regard to the Rubber question, were appointed, as follows: H. Judd, E. Honsinger, Louis Jack, S. H. Noble, J. S. Knapp.

Moved that the report of the Committee on Local Societies be received, and the committee continued and enlarged. Carried.

On motion of Dr. Dean, the Committee on Appliances were instructed to furnish a report to the Publication Committee, in time for publication. Carried.

The hour fixed for adjournment having arrived, the time was extended twenty minutes.

Drs. Cushing and McCall were appointed on the Publication Committee.

Additional members appointed on the Committee on Local Societies, by the chair, Thos. T. Moore, of S. C., and Louis Jack, of Philadelphia.

Dr. McQuillen was appointed delegate to the Southern Dental Society.

Adjourned to meet in Put-in-Bay, the first Tuesday in August, 1873, at 10 o'clock A. M.

REPORT

ON

PATHOLOGY & SURGERY.

BY HOMER JUDD, CHAIRMAN.

The study of pathology, a most important branch of medicine, is, so far as its progressive development is concerned, comparatively in its infancy. It embraces not only a knowledge of morbid changes in structure, but also a knowledge of those processes by which these material changes are brought about; the causes of these processes and their consequences. The consequences of these morbific changes constituting the symptoms of disease were doubtless studied much earlier than any other branch of pathological inquiry. We do not, however, intend to attempt to give a detailed history of the science of disease, but shall limit ourselves to a short *resume* of some of the pathological doctrines of the present day.

The study of symptomology, however, in the earlier ages, differed materially from what it is at this day, in that there was wanting that knowledge of physiology and minute anatomy, both normal and morbid, which was absolutely required in order to join it with its legitimate physiological and etiological relations. Nevertheless the study of symptoms was the most important part of a medical education during that long period of time extending from the commencement of the study to the dawn of scientific medical inquiry. The practice during this time being almost purely empirical, was determined to a great

extent by the name of the disease; for certain remedies had been found by experiment to be useful in certain maladies, and rules and regulations had been laid down by authors for their treatment without any appreciation of the whys and wherefores of such practice.

It cannot be denied but that this is the case to a limited extent at the present time, but at the same time we are undoubtedly making progress towards the attainment of a rational medical practice.

The study of anatomy and physiology had already accomplished much towards preparing the way for the successful investigation of disease, when Anton von Leeuwenhoek and Marcellus Malpighi brought the miscroscope, with its wondrous powers, to bear in investigations upon the tissues, and a foundation was thus laid for future developments and investigations which resulted in an accumulation of facts, which Bichat two centuries later collected and made use of as a nucleus for the formation of a new science; Histology opened a new world to the student of medicine.

A knowledge of morbid anatomy was not possible before the miscroscope had revealed the normal structure of tissues, and beside the agency of common poisons and mechanical or chemical injuries, the causes of disease were totally unknown, whilst the processes which obtained in normal and abnormal conditions were far beyond the reach of former methods of investigation. But the darkness and obscurity which have brooded for so many centuries over these most important and most interesting studies, begin to give way before the light which the miscroscope is constantly emitting, and medicine is rapidly emerging from the domain of empiricism and assuming the proportions and precisions of a veritable science.

It is evident that a knowledge of etiology is of more real importance than any other branch of pathology, inasmuch as upon this, to a great extent, must be based our hygienic

efforts, and the prevention of disease is of much greater importance to mankind than the partial restoration of lost powers and functional activities after organs and tissues have suffered from pathological changes, and which are seldom perfectly restored to their original physiological conditions. It is not strange therefore that etiology should be pursued as a study, with more engrossing interest than any other branch of pathological inquiry. Notwithstanding all these facts, our knowledge of the causation of disease has hitherto been, and indeed now is, exceedingly limited. Enough, however, has been wrought out in the last few years to inspire us with the hope that a not far distant future will reward us for all our labors. We shall be able to point to a few of the results of recent investigations which warrant us in these conclusions.

Although the etiological doctrines of this day are sustained by facts long known, it is still true that only during the last few years has the importance of these facts been recognized, and the resulting theories are therefore comparatively new.

Scabies has been a familiar disease since the time of Hippocrates, and was noticed as an infectious disease by the father of medicine himself. It was also observed that it was not one of those contagious diseases which are communicable through the medium of the air, like small-pox or measles, but that it was communicated only by direct contact with those affected, or by contact with clothing or other material which had been subjected to such contact.

Centuries ago, Avenzoar, an Arabian physician, first noticed the existence of an exceedingly small insect in certain diseases of the skin. This was also observed by others, among whom was Thomas Moufet, an English entomologist, who wrote a description of the insect. In the seventeenth century, we learn from the Cyclopedia of Practical Medicine, that Hyacinth Cestoni proposed the theory which recognized the acarus scabiei, *the in-*

sect in question, as the exciting cause of the itch. It is not necessary to notice here the almost interminable discussions which were held in favor of and against this doctrine. It was not only denied that the acarus scabiei was the cause of scabies, but observers of reputation denied the very existence of such an animal. M. Renucci, however, demonstrated the existence of the animal before several of the physicians of Paris, and the demonstration was so complete that the opponents of Cestoni's theory were obliged to abandon that line of defence, and fall back upon fortifications which were less assailable. They now admitted that such an animal existed and that it was sometimes present in cases of scabies, but denied its agency in the production of the disease. But further investigation showed that the parasite was always present in scabies, and that the disease could be directly produced by the insect; and, moreover, that scabies could not be produced by inoculation with the vesicular fluids or other morbid products of the disease, and the fact of parasitic causation was definitely determined.

Two or three centuries, however, elapsed after the discovery of the insect before it was universally recognized as the essential cause of the disease. The importance which attaches to this demonstration has not yet been generally appreciated. It establishes at once a principle in etiology which is tangible and certain. The grand fact that disease may be caused by parasitic influence is firmly fixed. The announcement of this simple etiological fact contrasts strongly with the theories, hypotheses and uncertainties which were connected with the mythical humors of Hippocrates, and the doctrine of Galen and Paracelsus; the one ascribing the causation of disease to heat and moisture, and the other to the influence of the four winds, and the plantary system. It also contrasts almost as strongly with the doctrines held at a much later date. For instance, with the mechanico-humoralistic doctrines of

Boerhaave, the neuroplastic doctrine of Willis and Hoffman, which attributed disease to spasm of the extreme vessels, and with the Brunonian theory of sthenic and asthenic diathesis.

Although Hippocrates and Boerhaave might both be called humoralistic as to their pathological views, there was really nothing in common in their doctrines, and nothing to connect either of them with the humoralistic doctrines of Billroth and other humoralistic pathologists of the present day.

The etiological doctrine of Hippocrates, of Paracelsus, and of Boerhaave, were purely hypothetical, whilst the doctrine of spasm had in its favor only the simple fact that spasm of the extreme vessels does, under certain circumstances, take place, but no connection had been established between this fact and the production of disease, and the same might be said of the sthenia and asthenia of John Brown. There was no stable etiological doctrine. The whole subject was involved in profound darkness, and the *speculations*—we would say rather than the investigations—of thirty centuries, had failed to relieve the impenetrable gloom with a single ray of light. The discovery, and subsequent demonstration of the veritable cause of one disease then, marked a new era in the history of medicine. The medical profession finally began to appreciate the importance of this discovery, and careful investigations were instituted to determine the cause of other diseases. The efforts of pathologists in this direction were not entirely fruitless, and the area of definite etiological knowledge has been sufficiently extended to encourage further effort.

Schonlein showed that the crusts on the scalp in Favus were composed of spores and germinal filaments. The controversy in relation to the agency of these elements in the production of the disease has been finally definitely determined, but the difficulty of the demonstration has increased

by the fact that these germs do not readily take root where transplanted, and the disease is therefore less infectious than some others. This fungus is identical with the mucor racemosus.

Eichstedt demonstrated the fact that Pityriasis Versicolor was caused by a fungous growth, and the same has been found to be true in regard to Herpes tondens, Herpes circinatus, Lichen circumscriptus, Impetigo figurata, Pityriasis rubra circumscripta, and Porrigo asbestina.

It will be observed that these demonstrations have reached only to a limited number of the diseases of a single organ —the skin—and until Zenker, in 1860, showed the connection between the trichina spiralis and the disease now known as trichinosis, no strictly constitutional disease was known to result from parasitic influence.

The establishment of this fact was important, inasmuch as it was now conclusively shown that not only were certain local affections of the skin caused by parasites, but that at least one veritable constitutional or general affection was also due to a like cause. We fear that we shall be obliged here to take leave of established facts in etiology, as we find that we have already reached the limits of our present knowledge. We have thus far purposely ignored the hypotheses of Saulsbury and Hallier, because they reach far beyond the domain of actual demonstration.

It might be well to remark, however, before taking leave of this subject, that the acarus scabiei, or Sarcoptes Hominis, as it is sometimes called, and the trichina spiralis, are visible to the naked eye, whilst some of these efficient parasitic agents in the production of disease are only seen by the aid of microscopic powers.

It is probable, therefore, that we have as yet only become acquainted with the grosser forms of these exciting causes of infectious diseases, and as the minuter forms will be more difficult to study and trace out, it is probable that this branch of inquiry will not soon be exhausted. It is the

opinion, however, of some of the best pathologists of the present day, that all infectious diseases are due either to vegetable or animal parasites.

Niemeyer enumerates as belonging to this class, measles, scarlatina, small-pox, cow-pox, typhus fever, typhoid fever, diphtheria, intermittent and remittent fevers, Asiatic cholera, dysentery, &c. It has been claimed by Lezterich that the parasitic cause of diphtheria has already been made out, but as some eminent pathologists are still in doubt as to the correctness of this view, we have not felt justified in placing it in the list of those, the causation of which is fully established.

But a report upon Etiology would be exceedingly defective if it did not take cognizance of a work upon this subject, the first edition of which was brought out only a few years ago, and the second, and greatly enlarged and improved edition of which, has but just made its appearance from the hands of the author—we allude to Beale's work upon "Disease Germs, their Nature and Origin,"

A casual observation of this book might lead one to imagine that the doctrine of disease, as there explained, would constitute a new theory, radically distinct from other accepted theories of the day.

Were this true, it would be sufficient cause for suspicion, in relation to its accuracy, for a science is not born fully matured, but it is always developed, as Herbert Spencer would say, "from the simple to the complex," or in other words, it grows from its embryonic germ, as the chick grows and develops from its germinal vesicle. Moreover, no one man can originate and perfect a science in all its parts; but it needs the labors of differently constituted minds to fully develop, perfect and harmonize it with all known facts and all established doctrines. Whilst, therefore, we should be cautious in receiving a new doctrine, based wholly upon the investigations of any one man, we find, upon closer examination of the investigations of Beale, that they do not mate-

rially conflict with, but in my opinion, add great strength to the doctrines which are now generally held by other laborers in this field of scientific inquiry.

It is true that the conclusions which Beale draws from his observations are at variance with conclusions arrived at by many others. One of these conclusions is, that "The particles concerned in the propagation of contagious diseases are allied in constitution to the living matter or bioplasm of the organism." And another, "That the disease-exciting material is in an actually living state," and whilst he does not deny but that vegetable parasites may produce disease, he thinks he has shown that "neither microzymes, nor bacteria, nor fungi, nor any of the lower forms of life, are concerned in the production, or in the propagation of the *contagious fevers* of animals and man," but he thinks, "The subtle poison originates and multiplies in man's own body or in the bodies of some of the animals domesticated by man." He also contends that the noxious bioplasm or morbid, contagious, living matter "has been derived by uninterrupted descent from the bioplasm or living matter of an organism which, at an antecedent period, may have been perfectly healthy." The one link which is wanting in this doctrine, seems to be an explanation of the nature of the changes in the healthy bioplasm of normal tissues, which should convert it into an active agent in the production of disease.

The points of coincidence between the doctrines of Beale and those of Niemeyer, Hebra, Lezterich and others, are, that they all attribute the causation of disease to the action or influence of living beings; or as Beale prefers to call them—bioplasms or living matter.

Now we hold that the veriest point of protoplasm which exhibits the peculiar phenomena of life, whilst separated from all other organic masses, may be properly called a living being; and if one observer shows unmistakably that the trycophyton tonsuraus produces one disease, and another

proves that a contagious fever is produced by a morbific bioplasm, the grand proposition which covers both of these points—that disease is produced by the action or influence of living beings—is sustained by both of these facts, notwithstanding there may be differences of opinion upon minor facts, in the minds of the different observers.

It will be observed that we have placed among the diseases which are known to arise from vegetable fungi, only local affections of the skin, whilst it is particularly in reference to the origin of *contagious fevers*, as advocated by Saulsbury and Pasteur, that Beale declares that he is quite unable to subscribe to the arguments advanced in favor of the "vegetable germ theory of disease." But, to place this beyond controversy, we only have to quote from the last edition of Beale's work on "Disease Germs; their Nature and Origin," on page 77, where he says: "The diseases of man and the higher animals, *known* to depend upon the growth and development of vegetable organisms, are local affections." And on page 86, he states that, under the head of Zymotic Diseases have been "included affections due to malaria and diseases depending upon the introduction into the body of living parasitic animals and vegetable organisms." We have been thus particular in showing that the doctrine of causation, as far as it is traced in this report, is not opposed to the views of Beale, because his opinion upon this subject carries great weight, standing, as he does, in the front rank of living microscopists. His doctrines in relation to the causation of contagious fevers by morbific bioplastic germs, is supported, not only by weighty argument, but also by an abundance of direct experimentation; and although his views are not yet generally accepted, they are having a marked influence in shaping the doctrines of the present day. Bold, self-confident and aggressive, he defends his own doctrines with vigor, and attacks the doctrines of those opposed to him, and demolishes them with an unsparing hand. In advance of nearly all others in using

extremely high powers in making his observations, he has placed himself in a position that the great body of microscopists have not yet been able to attain, and as a consequence, very few are yet able to corroborate or disprove his doctrines.

If these Ætiological doctrines of Beale are finally found to be correct, and we must admit that they seem to be well founded, and for the most part fairly explained, he has succeeded in solving a problem which all former efforts had failed to fully explain. If it be definitely deternined that the active morbific elements in Idio-miasmata are veritable living particles of matter, each particle or individual of which can grow and propagate its kind, and that these are the veritable agents which communicate disease from man to man, then shall we be constrained to admit that the microscope has achieved a triumph which chemistry has long essayed in vain.

But aside from the study of causation in contagious diseases, some other affections have been investigated during the last few years, with encouraging success.

All that is known about thrombosis and embolism, and metastatic abscess, has been wrought out by recent observers. We are indebted to the efforts of Virchow, principally, for a knowledge of the immediate cause of embolism and consequent metastatic abscess, but the primary cause of the thrombosis is not yet fully understood.

In relation to the diseases of the teeth and oral cavity, we must confess that the last few years have not been so fruitful in developing new pathological facts as in other fields of inquiry.

The cause of caries itself is not yet fully explained. Wedl is of the opinion that it is mainly due to the action of the secretions of the gums, though he states that fungous growths of various species are found in the carious tooth-substance.

Brucke, Rottenstein, and others have found the fungi

also, and are inclined to connect them with the carious process. Loviason, especially, claims to have proved, by experiment, that these fungous growths are the veritable cause of caries. He placed some carious tooth-substance in contact with a sound tooth kept warm in a glass bottle filled with water, and the result was, a true caries of the sound tooth. Fungi from a citron also produced the same result, under similar circumstances.

Schrott, in an essay upon the "Inhabitants of the Mouth," states that the green stain frequently seen on the enamel near the neck of the tooth, is due to the existence of vegetable parasites, the "protococcus dentalis," but it is not fully determined that this fungus is capable of effecting a lodgement upon the enamel, unless the latter be first acted upon by some substance which shall have already impaired its integrity, though there is little doubt but that it is capable of hastening the destructive process when it has once secured a foot-hold upon the softened tissues. It is not altogether improbable that we shall yet find that the chronic, inflammatory condition which exists in cases of absorption of the gums and alveolar processes, is due to the action of some of these "Inhabitants of the Mouth."

This is, however, as yet, hypothetical to a considerable extent, and something more than the superficial methods of observation which have characterized nearly all of the so-called investigations hitherto made in this country, will have to be resorted to before we can hope for definite answers to these questions, which are constantly presenting themselves for solution, but which have thus far presented themselves in vain.

We have purposely confined ourselves almost entirely to a consideration of the ætiological branch of this subject, inasmuch as it was the branch which had hitherto received the least attention, and as it would manifestly be extending this report to too great a length to follow out each branch to the same extent, only a few thoughts upon the processes by which

material changes are brought about, in tissues, whilst subjected to pathological influences, will be adduced, and we will close.

As normal tissues are built up by physiological processes, so they are, in many cases, broken or dissolved, by pathological or chemical changes, into their original elements, and at a certain stage in these metamorphoses—at that stage when tissues or organs cease to be capable of performing vital functions—death of the tissue or organ ensues.

Without expressing any opinion as the influence of force, chemically or vitally expressed in degenerative processes, we would merely mention a few facts which may have, nevertheless, some bearing upon this question. Among the degenerative processes, the fatty degeneration is perhaps the most common. We do not now propose to speak of that form of fatty degeneration, which, in muscle for instance, is characterized by a new formation of adipose tissue between the muscular fibers, but that variety in which the muscular fiber itself is changed or converted into fat.

In order to present this subject so that it may be clearly understood, it will be necessary to premise that muscle is, for the most part, chemically composed of the four elements, oxygen, nitrogen, carbon and hydrogen; and that it may, therefore, properly be called a quartenary compound, as it has been denominated by Newman; whilst fat, being destitute of nitrogen, has also been termed by the same author, a ternary compound. The essential difference then, chemically considered, between the two, being the presence of nitrogen in the one and its absence in the other.

The process then, that would convert muscle into fat, would consist in robbing the quarternary compound (muscle) of its nitrogen, and it would at once be changed into the ternary compound (fat). Bearing somewhat upon the nature of this process, it might be stated that nearly uniform amounts of nitrogen are daily lost by the living tissues, as evidenced by examinations made upon the excretions, which,

of course, is re-supplied to the tissues by the nutritive process.

Now it has been proved by Duvergie, who made numerous experimental observations at the Morgue, in Paris, that just about the same amount of nitrogen escapes from the body after death, in a stated period of time under favorable conditions as to temperature, as escapes from the living body in a state of health. In the process of decomposition in the dead body, the muscles become changed into adipocere by the escape of their nitrogen, and this process seems to possess all of the essential characteristics of a true fatty degeneration.

If nitrogen continues to escape from tissues, either living or dead, and is in no way re-supplied to the tissues, a fatty degeneration would seem to be the natural result.

We do not claim for these thoughts the consideration due to established doctrines, but have brought out these few facts as worthy of further thought and consideration.

DISCUSSIONS.

PATHOLOGY & SURGERY.

Reported by Prof. T. O. Summers.

The report of the Committee on Dental Pathology and Surgery was presented and read by Prof. Judd, who stated that at the time he prepared the report he did not know that a committee was appointed to report on the subject of etiology, and hence had prepared his report upon that special branch of pathology.

After the reading of the report—

Dr. Atkinson said: The subject now before us is, I am afraid, not appreciated sufficiently. It is too much for any one to attempt to convey clear concepts to those who have not given their attention closely to the subject under consideration. Hence, it is difficult to review such a paper as that just read, merely from memory. The field is so broad, the knowledge so contracted, and as the time for adjournment is on us, I feel embarrassed lest if I should attempt such a review in so short a space of time, I should condemn myself as I have condemned others.

We are in the infancy of Pathology, and only a master under *inspiration* can deliver himself with authority upon such a subject as this. It is like studying the *body* when only one-tenth of it has been brought under observation. The subject goes below the modesty and clear apprehension of the paper. It tells us about material processes. Now there is no such thing as differential material processes,

whether of protoplasm or bioplasm, which is brought forward as the co-efficient of function. We must know normal operations and conditions, that is to say *Physiology*, before we can know the abnormal or *Pathology*. And here I want a blackboard to show you what I mean.

We must start from the very beginning. This will give us the cancellations which we pass in our process of development up to mid-heaven itself. This is what the paper does, but it leaves us there afloat. The writer spoke of the certitude to which we had attained in our knowledge of the etiology of a disease which he says is certainly propagable by a local parasite. How does he know *that?* Learnedly we hear each writer upon pathology reported and recited, but we must do better than that. We must go beyond the empty verbiage of the past. He spoke, too, of "vital" and "chemical" *affinity*. He has no right to say vital as distinguished from chemical. How does he know whether it is vital or chemical. What is affinity? All that he knows is that it is activity of function. Now be it known that he who is in earnest to communicate an idea in his teaching gives it forth before the name. Now let us demonstrate. All things may be referred to one of two spheres, Physics and Consciousness. Now when these are married by energy, you have individuality.

When we say *Etiology* we mean divergent activity, not death. This then may be brought under the next department of individuality which is *Biology*. But there must be some habitat for the *living* animal, and hence we have cosmogony, reaching out to all the worlds. We have geology. Then comes psychology. Under the law of attraction and repulsion we have mineralism, then animism, the intellectual faculties, the loves and the higher spiritual developments. Here and only here, are we prepared to deal with protoplasm and bioplasm. Here only can we get a clear concept of that heterogeneous homogeneity and homogeneous heterogeneity of functions which constitutes *life*.

Now any disturbance in this order would give us a true etiology. So that you see I convey the idea to you before I give you the name. Passing through all the cancellations of all the ideas of evolution we come at last to the result. The human body is the result of the decussation and repression of force. *Huxley* imagined that he had stolen the livery of heaven when he brought everything under the domain of physics. Like as the fool says in his heart "there is no God," so the fool-physicist says there is no *intellect*. Now I beseech you don't follow *preachers* but *teachers*. Don't follow the barren verbiage of the past, but listen to the *teachers* of the present.

It behooves you above all things to know what is the difference between food and poison. All things at certain times and under certain circumstances may be either of these. I am disappointed, I am heartsick concerning this paper. I hoped the brother would go to principles, but instead of that he went fiddling about what somebody else had done. What we want is not the cursed snappishness of authors, each pulling the other to pieces and saying, "I know more than anybody else"; but men who go down to principles, who, when they speak of function, know what function means. We want to hold the cancellations of the past before us to know where we now stand. The paper does not seem to draw the line of demarcation between physiology and pathology at the proper place. It has ignored the law of primogeniture and continued lines of type. We have not got the alphabet of the body in which our *ghost resides*.

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"We must act before we are conscious of acting. Having been produced and well begotten, I have powers of observation. Making these observations in a truthful manner entitles me to expectation. Now I know that I am in the territory of mental philosophy, but we can't ignore this. In every department we see error, which is always the result of misplacing anyone of these stages of connection.

Habit is always the result of intelligence. This is no nonsense but stone-fence fact. If we must carry in detail the investigations of the past, our heads must be as big as mountains to hold it all. We must receive values by cancellation. Starting from pabulum we pass by differential cancellations through crystallosophy up to cellosophy. Then we have prolieration, as in the case of Southern woods becoming hard on the exterior by interval proliferation. Then rising higher we have corpusculosophy, and then an individual, where we are limited to a number of cells. Now false inference is the only path in which error can enter. Marry your intellect and your affections, and you will be prepared to receive the truth as it comes, beaming with the blessed radiance of the throne of God. I beseech you do not bind yourselves down to books. Now my brother Judd is so good that he is swallowed up by the smooth verbiage of those who set themselves up as teachers, when they have not passed the vestibule of knowledge.

Now, if I have said anything good I thank God for it. It has been to warn you of paying deference to fools without merit—mere fossils of the shells of busts of past times.

In all things be kind. Unkindness kills, but kindness cures. Now in kindness I say that the paper is not what it should be. How many got any good out of its recapitulation of exploded theories and empty verbiage of past conceptions? I repeat, what we want is *principles*—clear concepts of truth which we cannot get from books."

PROF. JUDD said—I do not rise to make a speech, but only to explain myself. In the first place, Dr. Atkinson stated that there was no such thing as material processes. Now I took it for granted that when foreign matter is being assimilated by living matter, certain processes go on which are generally understood to be *material* processes. When tissues are broken down it is commonly understood to be a *material* change which goes on. When muscle is converted into adipocre, by the abstraction of nitrogen, certain

changes go on which are generally understood to be *material* changes. I said nothing about forces, and was very careful on that point. I treated with care the point as to whether we had attained to any definite conclusions from the investigations of the past. I thought we had arrived at a standpoint from which we could reason, though he says not.

It was shown, in the first place, that whenever there was scabies there was always an insect. This was strong presumptive evidence that the insect had something to do with the cause of the disease; but it was not till long after, that Cestoni supposed that this insect might be the cause of the disease. He demonstrated that the *acarus scabiei* was always there. Now I want to talk on facts. I'll leave entirely to the last speaker all that lies in the region of speculation and metaphysics. This was common in the days of Galen, when darkness brooded over all, and for twelve long centuries pathology rested. Then, men began to look around them, and instead of dealing with hypotheses about *consciousness* and the like, they set to work and wrought out a system based upon the facts which they had developed.

But to return. In the second place the *acarus* was observed to burrow, and produce a vesicular eruption, but it was not yet definitely settled as to whether it was the cause of the disease which it was observed always to accompany.

Further experimentation showed that the disease could be directly produced by transferring an acarus from one who had the disease to a healthy person, and also that scabies could not be produced by inoculation with any other products of the disease. Now, as far as human demonstration can go, we have gained our point. This is demonstration—this, gentlemen, is science. We have here a demonstration of the fact that we can understand causes, and not processes alone. The gentleman asks how many got any good out of that paper. You can judge for yourselves con-

cerning that. He took exception to my use of the word "constitutional" in speaking of trichinosis. I used it in the sense of "general." I hope others will express their views upon this subject.

DR. ATKINSON—I have no personal ambition to subserve in this matter, but I wish to set myself right on several points. Prof. Judd charges, with great unfairness, upon me, that I deal in *consciousness*, he in *facts*. I would like to know how you get facts without consciousness? I force myself to a depth of humility that can be reached by no physicist. He says that the *acarus scabiei* goes in and *produces* the vesicle! My God! what immense perception must he have to keep on saying that. The effect is produced by the physiological function of the part, and the divergency of function is produced by what produces the vesicle. Now, if you throw away your books, and "go for it," we won't have polemics, but the question will be who can perform his work the best. As it is, the physicist and spiritualist are always bandying words, and it is because of this that truth has tarried. They don't see what a dreadful thing it is to have functional derangement. He don't know anything, and W. H. Atkinson has the hardihood, or the humility to say that all knowledge comes by *inspiration*. And now, I ask, did the acarus produce the vesicle as a cause, or was it only the occasion of its production?

DR. MCQUILLEN—I have listened with satisfaction to the paper, and to the response, and in reference to investigations, I would say that we find our reasoning either inductive or deductive—either according to Plato or Aristotle. For myself, I consider that of Bacon the safest, to take facts, and draw deductions from these.

I do not agree with a preceding speaker, that all knowledge came from the inner consciousness of man, independent of schools and instructors.

The erroneous views of nature held by primitive man

were notorious, and it was only after succeeding generations had revised and re-revised these opinions and beliefs, that a tolerable approximation to truth was attained. A child with an intellect ever so bright, on reaching maturity, without pupilage, would be unfitted to grapple with the great problems of nature and of thought. He must submit to teachers, and avail himself of all the helps thrown in his way. In the arts, in science and letters, men must first be apprentices, and then workmen, before they can expect to be masters. The unwillingness to submit to the full period of apprenticeship was the reason why there were so few masters and so many pretenders in every department of science and art.

DR. ATKINSON—Answer me, what was in the mind of Columbus when he conceived the idea of the New World?

DR. MCQUILLEN—He was not the first to conceive the idea. His views were the crystallization of ages. Long before the steam engine was invented, a preliminary train of investigation and observation had been leading up to it. It has been said that when an Englishman wishes to know anything concerning an animal, he goes to the Zoological Gardens, and observes its habits; the Frenchman goes to its native country; but the German shuts himself up in his inner consciousness. If there is one man who, more than another, expresses himself without dogmatic assertions, it is the truly scientific man. His statements are always made after this manner—"I have observed such facts and I draw such inferences." That's what I like about our friend, Prof. Judd. The truly scientific man is always careful, for he knows the observations of to-morrow may set at naught and revolutionize the theories of to-day. If he pronounces himself dogmatically, he has committed himself, and he must either acknowledge himself in error when his theories are proved untenable, or say, with the Irishman, when told that the facts were against him, "so much the worse for the facts."

DR. ATKINSON—Since we have had a very learned department of pathology referred to, I shall endeavor to present to your minds the *Etiology* of phosphor-necrosis. I do not hope to get all of you to understand what I am about to say to you, but I pray you to sit quietly and receive inspiration. In studying functions, we must first learn the bond of union which sustains its operation.

A Member—What do you mean by bond of union ?

Dr. ATKINSON—I mean this. Ten years ago you wrote water HO. But it was found that this did not represent the facts, Men assumed that they had gone through the temple of knowledge when they had only entered the vestibule. In investigating, however, it was ascertained that it required two volumes of H to combine with one of O, and it was then rightly denominated a dyad element. An element like oxygen, however, which, united by one volume, was called a monad element. The bond of union, therefore, in this case, is that which holds together the two volumes of H and the one of O to make water. I use this example because it is the alphabet of all. Nitric acid, though more complex in its combination, is under exactly the same law.

Let us go down the scale in the process of pathological destruction, until we arrive at the bases of the origin of forces in bodies. Here we reach physics and consciousness, which, being married together, give us sentient living beings—individuality. Then comes cosmogony, geology, and so on.

Sulphuric acid has been empirically discovered to act upon dead bone. Now if we can properly apportion this affinity, we have effected cure. The best proportion seems to be, water one-eighth to one of the commercial acid, or the aromatic sulphuric acid—the elixir vitriol of the shops.

A Member—What is the effect of phosphorus upon pabulum ?

Dr. ATKINSON—Union, chemical affinity. Now, sulphuric

acid acts upon dead bone. It kills bone pabulum, but will not act upon calcified bone. This has been clearly established in Paris and in New York. Now I don't expect any butcher can demonstrate this, for it must be very carefully applied.

A Member—Is chemical affinity a mode of motion?

Dr. ATKINSON—Yes. There are certain relations which must be established in order to sensation. In order to taste there must be solution. The essential pre-requisite to touch is resistance—to sight, undulation. This is all accomplished through molecular vibration. We must have an exact analogical relation established. When that synthetical rhythm is onward and upward, we have physiology—when it is downward, pathology. When it goes down slowly, it is curable, when it goes down rapidly it is incurable. This is a rule by which you can be always guided.

REPORT

ON

DENTAL CHEMISTRY.

By D. S. DICKERMAN, Chairman.

The duty of writing a brief report on Chemistry has devolved on me. In order to be valuable, a report of this kind should emanate from a Professor of Dental Chemistry, or, at least from one who has made this science a daily study in his practice.

In giving you a few crude ideas on this subject, if they are not as valuable and brilliant as you might wish, be kind enough, gentlemen. to accept the will for the deed.

Chemistry teaches us the close and invisible connection between particles of matter, and, by analysis and synthesis, we discover the laws which govern their combination.

Chemistry, as known by most dentists of the year 1872, is the chemistry of a century ago—old traditions, with the least possible amount of actual knowledge.

The above fact should seem startling when it is known that all decay of the teeth is due to chemical changes in the mouth, and I put the question to you, gentlemen, whether in the future a good knowledge of chemistry *may not* obviate the necessity of operative dentistry in many cases.

Less attention has been probably paid to this branch of science than to any other pertaining to dentistry; to more than two-thirds of the profession, chemistry, I apprehend, is a sealed book.

In order to have in the future a more thorough understanding of this science, the *principles* upon which it is based must be studied with as great a degree of vigor as those of the other sciences, as it is one of the great foundations underlying our profession, and ranging side by side with anatomy, physiology and surgery.

The stronger mineral acids destroy the teeth.

Hundreds of dentures ruined by the use of these acids, are a sufficient answer for a want of chemical knowledge.

Sulphuric acid, will partly dissolve the phosphates with disintegration.

Nitric and hydrocloric, will dissolve the phosphates completely.

Sulphuric and nitric dissolve soft tissues.

It has been claimed that mineral acids may be used with benefit in some cases; but, if used at all, *they must be used by a master.*

This plodding in the dark, with an inadequate idea of the why and wherefore, has tended to level us *down* instead of *raising* us as a profession.

We must work and investigate for ourselves in this branch of science, which is one of the *sine qua nons* which go to make up the sum total of our glorious profession.

Knowledge may be acquired in this science from the printed page, or by working out miracles by experiment, for every experiment which produces anything new and valuable may be said to be a miracle.

Nature's works and her laws of regulation open a wide avenue for investigation.

Nature's facts are supposed to be the will of God.

It is said that knowledge gained from observation and experience is unlike that which is strictly intellectual. The learned philosopher, Herschel, has said, "a clever man shut up alone, and allowed unlimited time, might reason out for himself all the truths of mathematics, by proceeding from those simple notions of space and numbers, of which

he cannot divest himself without ceasing to think; but he could never tell, by any effort of reasoning, what would become of a lump of sugar, if immersed in water, or what impression would be produced on the eye by mixing the colors yellow and blue."

That we are more densely ignorant as scientists than as manipulators is a fact, I apprehend, beyond a question, and it may be said to arise, at least in part, from the fact that the "veriest fool" in a literary point of view is able to *bore a hole* in a tooth and *stuff* it with gold passably well. I suppose that every dentist of average mechanical ability, who has had the common advantages of dentists, is competent to fill in a proper manner, almost any cavity in a tooth, so far as mechanical manipulations go, but how many, think you, can detect signs of the breaking down of tissues from inherited frailness, or from a diathesis which forbids extensive or expressive operations on the teeth.

For want of a knowledge of pathology and chemistry, many an operator has been ruined in his practice.

I apprehend that the profession has more to learn in *this* direction than in any other; something more than manipulative skill is needed. A knowledge of chemistry is demanded and is important, if we would be successful operators any length of time.

The prominent acting causes of decay, or agents at work *in* the mouth and *on* the teeth are mainly acids, and having an affinity for the teeth, to use a common expression, "*go for them,*" leaving ruin and desolation in their path.

These acids may be either vegetable or mineral, introduced either by decomposition of *food,* condiments and medicines, or an altered condition of the secretions of the mouth, which in health are considered alkaline.

The free use of lemons, however valuable as tonics, must be guarded with great care; alkaline washes should *always* be used after their administration: bicarbonate of soda I regard as the best, it neutralizes acids completely, and as it lacks causticity does no harm.

I have seen many sets of teeth completely spoiled by this common practice of eating lemons. As a rule, do we not look too far away for the causes of decay? Do we not imagine that some occult influence is at work to destroy the teeth, when the causes are in full action under our eyes, and which we might see and know if we would use them?

There is a difference between gases in the air and in combination.

Air is about four-fifths nitrogen, one-fifth oxygen by volume. From Miller's table we have:

Oxygen,	20.61
Nitrogen,	77.95
Carbonic acid,	.04
Watery vapor (average)	1.40
	100.00

N + O, mixed in air, are respirable: the two combined form nitrous oxide, harmless in small doses.

Nitric oxide, NO, deadly. Hyponitric acid, N,O^2, nitrous acid and nitric acid, all deadly when inhaled. The latter terribly caustic.

The great mass of the public err through ignorance; it is our duty to dispel this cloud; probably there is less information in the newspapers in regard to the scientific treatment of teeth, than on any subject that is treated in their pages—of course I except the unreliable and selfish advertisements of the *quack dentist.*

Very many of our patients we do not see until after they have passed the age of twelve years, and the laws of chemistry have not been suspended during this time.

Perhaps the little patient has never used a tooth-brush, and but for the conservative influence developed by our primitive cravings for roots and nuts, these organs would be in far worse condition than we sometimes find them. Chemical changes are always going on in the month, and

only absolute cleanliness can arrest them. Hence we muts have daily teaching to all our patients.

We have been crying for the last decade of years or more, "educate the dentists." This refrain must be kept up if we would know the mysteries of heaven and have our ignorance corrected. We must study the science of chemistry with the other sciences that pertain to our profession, so that we may *understand* and operate from *principles* and with a *principle*; we must also educate the masses. Uneducated people, as a rule, are satisfied *with* and *call* for low priced work; quacks by the thousands respond, and worthless, ruinous dentistry, the curse of our profession, is the result.

In a short paper like the present one, it will not be expected that I shall read to you the constituent parts of any or all organs. I only wish to call your attention to a few salient points, and the defects in our present system of dental science.

There is no good reason why the child should not be taught something more of that wonderful organ, the mouth, and its uses, than he now gets, if at all, in a few words from the modern physiology in our schools. Not one half of the teachers in our common schools, probably, keep their own teeth properly filled and cared for.

In conclusion, allow me to suggest that this Society adopt as the surest means for the universal dissemination of the science of dental chemistry, some popular treatise for our common schools on the above subject.

The chemistry of fifty years ago is not like that of today. Many of the most brilliant discoveries are due to a knowledge of chemistry.

Dyes with tints that rival the most gorgeous hues of created nature, owe their effulgence to this knowledge; but the domain of dental science has been sadly neglected. The same brilliant discoveries a world of happiness to mankind—money—the lever that moves all this, and lastly, undying fame awaits the successful explorer in dental chemistry.

DISCUSSIONS.

DENTAL CHEMISTRY.

DR. BUCKINGHAM, being called on, said—I do not know that I have anything to offer, which is not already known, or at least, should be known by all practitioners of dentistry. Until recently, chemistry was confined to dead matter and the changes that took place in it. The functions of animals and vegetables were considered to belong to physiology, and these two branches of science were taught and studied separately; now, by many of the most eminent investigators, physiology is thought to be but a higher branch of chemistry, and the changes that take place in animal and vegetable economy, are subject to and governed by the same laws that govern inorganic matter. They think that there is no such force as life force. They admit that they have not yet been able to make living tissue in the laboratory, but they have made compounds that very closely resemble dead animal tissue.

The investigations in chemistry have been extended in every direction, and the science has become so enlarged, that it is impossible for any one individual to do more than follow it out in one direction. While those advancements were being made, new theories have sprung up, and one of the last and perhaps the most important, is a new nomenclature.

Every student of chemistry must admit that the old nomenclature was defective: it would have been strange if it had not been so. It was adopted nearly one hundred years ago, when chemistry could hardly be called a science; and

although it has been modified and slightly altered and amended at various times, it still retained its original form. It has been the custom, until recently, to write the symbols for water, HO, and for sulphuric acid, SO^3+HO, and for nitric acid, NO^5HO. But it is now proposed to write them H^2O and H^2SO^4, and for nitric acid, HNO^3, and express the combination by volume instead of by weight. Now, to make so great a change in the nomenclature as is proposed, will cause great confusion, particularly to those who have become familiar with the old; whether the new nomenclature will be universally adopted, remains to be seen. Many of the old institutions still retain the old form. It is important that we consider well before we change from an old established system to another, for many changes cause confusion. We do not understand the principles sufficiently yet. We only know, theoretically, that 2 H is equal, in combining power, to 1 O.

I hardly know how to go on upon this subject, it is so vast and varied. If there is any new point that I can explain, I will be glad to do so. But the business of professors of chemistry is to teach the elements and not to enter into the higher investigations of the science. We are not expected to take up these.

Prof. Summers, of the Southern University, (Ala.) was then called for.

He referred to Dr. Buckingham's remarks, in reference to the new nomenclature, and stated that there was no university of any note, in the country, that had not adopted the new nomenclature. He showed how it was superior to the old, in that it expressed in one symbol both the atomic weights and volumes of elements entering into composition. He said that many were really persuaded of the superiority of the new to the old; but on account of pecuniary considerations on the part of authors, and laziness on the part of teachers, it had not been universally adopted. He thought,

however, that the new nomenclature would be introduced into the new Dispensatory.

He next called attention to the action of agents upon the teeth, and seemed to regard alkalies as more deleterious in their action, when in excess, than acids. The latter appeared to act by combination, the former by disintegration. He thought that caries was largely due to the change in temperature to which the teeth are continually subjected, in the introduction of hot and cold substances into the mouth For this, he thought there was no remedy, as the stomachs of the people will not submit to hygienic regulations.

He then spoke of the glycerol of thymol, which had been lately introduced as a therapeutical agent. The great objection to its use, was the intense pain which it produced on application. He recommended the use of cumal, or which was as good, the essential oil of cumin or rue. These, he said, seemed to act with just as much promptness and efficacy upon the tissues as the thymol, and yet without so much pain.

He spoke next of nitrous oxide, and claimed for this agent all that has been said in its favor. He regarded it as the "*coming anæsthetic.*" He said that, when properly prepared, it was perfectly harmless. To insure its purity, it was necessary to pass it through at least two bottles of the saturated solution of the proto-sulphate of iron, two of caustic potash, and two of distilled water.

He claimed that when pure animals could be kept under its influence for a day at a time, without any injury, he was satisfied that it did not produce any change in the blood, but that it acted directly upon the periphery of the nerves.

DR. ATKINSON wished to know whether nitrous oxide did not act as an anæsthetic, simply by "*privity*" of oxygen.

DR. SUMMERS thought not; as it seemed to produce an immediate effect upon the periphery of the nerves, and the arterial blood did not give any evidence of a want of oxy-

genation or of excessive carbonization, which would always follow the deprivation of oxygen.

DR. BUCKINGHAM—I do not wish to be understood as being opposed to the new nomenclature; for in many respects it is superior to the old, but it is only the revolution which such a change must necessarily produce in this profession, which I do not think should be suddenly brought about.

As teachers, we are required to touch these elements, and not to enter into arguments to prove that this or that theory is correct.

In reference to the new nomenclature, the gentleman stated, there was no university of any note in the land which had not adopted it. I cannot say with reference to the universities, but I do know that some of our best colleges hold on to the old—the new is not taught. In the Jefferson Medical College, nor in the High School of Philadelphia, and in the College of Pharmacy, both the old and new are used, nor have the editors in the last edition of the Dispensatory of the United States adopted the new.

DR. MCQUILLEN said—In reference to the action of nitrous oxide and other anæsthetics, the view of Flouriens that it was due to impressions made directly upon the cerebro-spinal centers, appeared to him founded in reason. Exceptions had been taken by Snow, Richardson, and Sansom, who attributed the induction of anæsthesia to a changed condition of the blood, and the deprivation of the nervous system of a due supply of oxygen. This opinion had been expressed thus—"narcotism is a suspended oxygenation." He then briefly referred to his own carefully conducted experiments on the action of anæsthetics on the blood corpuscles, as disproving the latter hypothesis. In those examinations, no perceptible change could be found under the microscope in the blood corpuscles taken from man or animals, to whom chloroform, ether, or nitrous

oxide had been administered. These facts were in accord with the opinion just expressed by Prof. Summers, that there was no alteration of the blood produced by the administration of nitrous oxide. It was a matter of regret that the assertion of Dr. Richardson, of England, that nitrous oxide was an exceedingly dangerous agent, the most to be feared of all anæsthetics, had made such a profound impression on the minds of the surgeons of Great Britain and America. Dr. R. said, several years ago, that all the animals he had experimented on with nitrous oxide died, and its employment as an anæsthetic with human beings, would be attended by frequent fatal results. To test the correctness of these statements, the speaker had, in the presence of a number of gentlemen, kept various animals under the influence of nitrous oxide for a considerable time (in one instance a rabbit for an hour and ten minutes), and yet, without a single exception, all of them were speedily restored to consciousness upon the withdrawal of the agent. The most conclusive evidence that it was the least dangerous of anæsthetics was presented in the fact that millions of patients had been under its influence for dental operations, and not unfrequently in the hands of inexperienced and incompetent persons, yet only one or two fatal results had been reported as occurring from its use, and it was a matter of question whether these could be justly charged to it. In addition to this, nitrous oxide had been used in a few instances where prolonged surgical operations were demanded, and the patients maintained in a condition of narcosis for more than an hour, without any unpleasant results following the administration. The introduction of liquid nitrous oxide was an important event, and the ease and safety with which it could be kept for an indefinite period in strong iron bottles, placed in neat portable cases, would be attended before long, it was reasonable to infer, by a general use of the agent on the part of surgeons for capital operations.

DR. BOGUE said—Prof. Summers stated that alkalies act in an analytical manner upon the substance of the teeth, while acids act synthetically. I would simply ask him how do you know that? From all that he has said, we are to infer that alkalies are much more dangerous to the dental tissues than acids. Now it remains unproven to this day that acids are invariably found in the mouth. Indeed it has been found that when cows and horses are badly fed, their saliva is nearly always acid, which is not the case with those that receive proper nutriment.

Now, as to the glycerol of thymol, he stated that great pain was produced in its application. Now, I question whether it would produce any pain where the pulp had been destroyed.

And one more statement,—"we cannot educate the people." Now I claim that we can educate them. I have so trained my patients that I have not a filthy mouth in all my practice. It is too bad to throw anything in the way of efforts that may be put forth to bring the people to a proper sense of the duty resting upon them, to take care of their mouths by the exercise of hygienic restrictions. It is possible to educate them, and I believe the profession will bear me out in this. In regard to experiments upon the teeth, I would say, investigators have been greatly divided in the conclusions at which they have arrived. A great deal of this difference is due to the manner in which the experiments are made. It is well known that tissues are far less liable to destructive influences when in a vital condition than when their vitality is destroyed. Hence, those results gained from experiments upon the dead tissue will not in all cases apply also to those possessing vitality.

DR. SUMMERS said that—There was no such thing as a separate and distinct force which may be called a *vital force.* He maintained that the operations of the body were carried on under the same laws which govern the operations upon the chemical table. The great argument presented by

the vitalists in support of their theory, he said, was this, that if the stomach be taken out of the body and placed in another stomach, in which vital action is going on, the dead stomach will be digested by the living one. The question was then triumphantly asked, why is not the stomach destroyed by its own juices if its vitality does not resist them? And again, it is alleged, the stomach is often after death, destroyed by the action of the juices which remain in it. Now, if they would only look deeper into it, they would see that it is not *vitality* which resists the action of the gastric juice. Indeed the gastric juice does operate upon the stomach sufficiently to destroy the epithelium which overlies the mucous membrane. And when it comes to the layer immediately superjacent to the blood-vessels, the stomach becomes of a brighter hue, indicating that the blood is near the surface. If now, a piece of litmus paper be introduced, it will indicate alkilinity, which by exosmosis comes through the walls of the stomach, and neutralizes the effect of the gastric juice. The stomach thus becomes a bag, with alkaline walls, which resists the action of the juice according to chemical laws alone.

In reply to Dr. Bogue's remark concerning the pain produced by glycerol of thymol, he said that he, of course, did not think that the Association would suppose for a moment that he intended to convey the idea that there could be pain where there were no nerves to manifest it.

Dr. Atkinson—I have no object to gain in this matter, but yet, I wish to explain a point which has just been touched upon. The reason why the glycerol of thymol produces pain, is because glycerine, being a form of sugar, is very painful to an exposed pulp. But the glycerine is only used as a menstruum, thymol is the agent. Hence, what has been said, does not militate against any of its powers. I only recommended glycerine as a solvent because

it was so much more inexpensive, since the thymol itself had to be fused or dissolved before using. In reference to nitrous oxide, while I respect my friend and his views, yet I do not think he understands what he is talking about. I asked—Does not nitrous oxide owe its anæsthetic action to privity of oxygen, the effect being nearly negative? He did not seem to know what he should have known, when he set himself up as a teacher. I say *yes*, it does. Now, if he will *show* me that this is not so, and that nitrous oxide does not produce an evil effect upon the system—well—I'll sell all I have and give to the poor, that's all. Now you know I believe anæsthesia to be of the devil. I say pain ought to come. To prevent it, is to prevent that divine influx which makes us like unto God himself. Whenever you invade the territories of the nervous and vascular systems, you had better take care. Privity of oxygen, I repeat, is the only anaesthetic agent. This seems to be a point that must be cleared up. Now I love my young friend all through; he is a living witness to the doctrine of metempsychosis, for he is an old philosopher, come back to us again, and I am sorry to see him stopping with mere beliefs, instead of pronouncing with the certitude of proved aphorisms. He stated that the arterial blood was not changed in its appearance. Now, one of two things must be true—either we have used something else than nitrous oxide, or else the death-like pallor and purple lips do indicate a change in the blood, produced by this agent. He said he prepared his very carefully, and I bless him for it. But he said that he had never seen any bad effects from its use. Here I would enter a *caveat*. The tempter is there. Let the purchaser beware. No man has proved that yet. And since pure nitrous oxide, being so difficult to obtain, this ought to make us very careful how we administer it. When, in their experiments, these gentlemen turned the animals into the air, after exhibiting signs of anæsthesia, the oxygen causes them to return to molecular consciousness. This is a good example. It is simply when

the oxygen is withheld that anæsthesia is produced in all cases.

DR. MOORE said—that he had, in the South, noticed the purple lips and death-like pallor produced by nitrous oxide, and thought it indicative of a change in the blood.

REPORT

ON

DENTAL THERAPEUTICS

By H. L. SAGE, Chairman.

It would seem a difficult task to gather matter of interest from a field which has been so thoroughly canvassed by able minds, as that of Dental Therapeutics—especially when no new remedies, so far as we are aware, have been brought to light, since the reception of the last report.

During the interval, however, let us hope that some progress has been made with regard to the effects, manner of action, efficiency, methods of application and adminstration of the various remedies employed in our specialty, and that a more correct understanding of the relative value of each is being arrived at. Of those with which the dentist has to deal, perhaps it may be said that those having a topical value constitute the larger part, the administration of those having a general or constitutional effect being mostly limited to medical practice, and in the present state of advancement of the dental profession, as a body, this is proper. Notwithstanding, there is, or should be, such a transition from one to the other, or such a blending of the knowledge requisite for medical practice with that of dental, that, in the prosecution of the latter, much of the benefit capable of being derived from the former may be appropriated and made effectual and practical.

In the presentation of this report, a necessarily partial and imperfect review, derived from the most accessible and

convenient, though limited sources, must be had of the nature, composition, action and degree of success of the remedies with which some experience has heretofore been had.

The full value of those in common use, doubtless yet remains to be realized, and in order to this it is essential that a knowledge be had of the pathological conditions of the tissues to be acted upon, the special character and stages of disease in which the employment of certain agents would be indicated, with a consideration of the modifying influences of time and manner of application and administration.

As one has forcibly remarked, the profession needs bringing up in the use of the ordinary remedies, which is quite as important as the introduction of new ones. This can only come from the earnest investigation and experience of the many, with the impartation of the knowledge acquired and the opinions entertained, the latter to stand forth full fledged, only when backed by positive knowledge, but otherwise advanced for the laudable purpose of eliciting the truth. With these preliminary remarks, attention will first be called to a remedy, which, though not new, has not until recently, so far as we are aware, been employed in dental practice, excepting it may have been as an application for the relief of pain produced by an exposed pulp.

Reference is made to a preparation called carvacrol, which has, to some extent, been used locally for obtunding the sensitiveness of dentine, and with good results. Carvene, carvol, and carvacrol, are products of the essential oil of caraway, which is isomeric with the oil of turpentine.

The oil of caraway consists of two liquid oils; one a carbo-hydrogen, called carvene, C^{20},H^{16}, and the other composed of carbon, hydrogen and oxygen, C^{20},H^{14},O^{2}, and named carvlo, the boiling point of each being respectively 343° and 482° Fahr.

When the oil of caraway is distilled from hydrated phosphoric acid, the distillate being poured back into the retort until it ceases to have the smell of caraway, the product is an oily liquid called carvacrol, having a disagreeable odor and a strong, acrid, and very persistent taste. (U. S. Dispensatory, 18½, page 1,304.)

Carvacrol is also obtained by treating oil of caraway with potash, or again by treating the same oil with iodine, cohobating several times, and washing the product with potash. Thus obtained, it is mixed with carvene. Carvacrol is also found among the products of the action of iodine on camphor. Carvacrol, when pure, is a colorless, viscid oil, lighter than water, in which it is nearly insoluble.

Carvene is a colorless, transparent, mobile oil, having a slight disagreeable odor and aromatic taste. It is soluble in alcohol and ether. Boiling point 73° C. (Watt's Dictionary of Chemistry, Vol. 1, Page 807.)

Carvol is the portion of oil of caraway which passes over between 225° and 230°, being separated by repeated fractional distillation. Carvol and carvacrol seem to be essentially the same. Carvol C^{20},H^{14},O^{2}. Carvacrol C^{20},H^{14},O^{2}.

Carvol appears to be transformed into carvacrol by the simple application of heat (Volkel). By distillation with glacial phosphoric acid, it is also converted into carvacrol. It likewise yields carvacrol, when distilled with hydrate of potash. (Schweizer.) It is isomeric with cuminic alcohol, thymol and carvacrol. Properties: transparent, colorless, mobile. Smells like carvene. (Volkel.) Boiling point above 250°.

The odor of carvacrol is like that of creasote. (Volkel) (Claus.) Taste, persistent, strong and biting (Schweizer), like that of creasote, sweetish at first, afterwards scratching (Claus). Somewhat soluble in water, rapidly in aqueous potash, alcohol and ether. Boiling point almost exactly 232°. (Schweizer. Leopold Gmelin's Hand Book of Chemistry, Vol. XIV.)

Carvene, carvol and carvacrol in their action are sedative, carminative and stimulant. Attention was called to the use of carvacrol as an obtunder of sensitive dentine, by Dr. J. R. Walker, of New Orleans, whose success with the agent seems to have been gratifying, and who affirms that it is superior for the purpose, to anything which he has ever seen, having made a trial of all the other remedies which he has heard recommended.

The mode of operation is to dry off the sensitive portion, and apply the carvacrol in full strength once a day, until the desired effect is produced, the time depending upon the severity of the case, or the regularity of the treatment.

By placing, when practicable, melted wax over cotton, saturated with this agent, and placed in the cavity, perhaps the result may be obtained with greater rapidity, if not in a larger degree. As the hyper-sensitiveness of dentine is often dependent upon the presence in the fluids of the mouth of an excess of acids or alkalies, anything that keeps the carious cavity from contact with these until the dentine recovers from their effects, will produce the desired result.

In some cases a cavity may be prepared with sufficient thoroughness about the borders to insure the retention, for the required time, of a filling of the oxychloride of zinc, when, upon the removal of the compound, the sensitiveness will have disappeared to such an extent that the operation of shaping the cavity for the insertion of the permanent filling, may be proceeded with, without further discomfort.

But as these fillings, when tested, show an acid reaction for a considerable length of time after the process of hardening is completed, it would seem that in those mouths in which the fluids are alkaline, the effect would be more thorough if the sensitiveness might be due to the presence of an alkali. Were the secretions acid, the reduction of the sensitiveness might be due, not to the introduction

into the cavity of this acid compound, aside from its caustic action, but to the substitution of the smaller amount of acid contained in the filling, for others larger in quantity, (considered relatively in connection with the time of contact) and different in kind, which, by this means, are shut off from contact with the exposed dentine. But, as before intimated, the abatement of the sensitiveness may be due, also, to the escharotic action of the chloride of zinc upon the terminal ends of the fibrillæ in the dentinal tubuli; for, were the only effect of the oxychloride of zinc to shut out from the cavity the abnormal secretions, a gutta percha filling would be equally valuable, provided it could be as perfectly adapted to the walls of the cavity.

The irritation produced by heat and cold, causing, it may be, a degree of inflammation in the fibrillæ, is perhaps removed by the insertion of any filling with non-conducting properties, when the dentine, having progressed *towards* a normal condition by the abatement of the inflammation and with it the tenderness—perhaps a further solidification or calcification thereof may take place, or a deposit on the surface of secondary dentine. This should be qualified by saying that, strictly speaking, the fibrils do not become calcified when in a perfectly normal condition, any more than secondary dentine is formed without the presence of inflammation (irritation), and that both pulp and fibril calcification are also due to the process by which nature is stimulated to throw out material for repair. Calcification of the pulp being due to overstimulation, or to a determination thereto, of liquor sanguinis, with ossific matter in excess.

A more transient and superficial effect is produced in the way of removing the sensitiveness, when the chloride of zinc is applied in solution or in full strength. The pain caused by the application, however, is nearly as objectionable as that produced by excavating the cavity, or, to use a well-worn phrase—"the remedy is as bad as the disease."

The glycerole of thymol has likewise been recommended for the same purpose, by the following method of application:—First cleanse and dry the cavity, and apply the thymol to the sensitive portion, maintaining it in place, and securing it from contact with and dilution by the fluids, by flowing over it melted wax.

Arsenious acid, though effectual, has, owing to the great danger attendant upon its employment, by its action upon the pulp through the dentinal tubuli, been discarded by the most careful operators, and in the discussions of dental societies, the opinions expressed are quite unanimously adverse to its use for obtunding the sensitiveness of dentine. But even now, it has occasionally, though rarely, its advocates.

Tannic acid has been suggested by some as a good obtunder. Mr. Tomes says in regard to this: "Tannic acid, mixed with a solution of gutta percha and chloroform into a thick paste, will, if introduced into the cavity, duriug the course of a few days reduce the sensibility of dentine sufficiently to allow the operation to be performed," and also that "any form of temporary filling, if introduced with sufficient care to exclude the saliva, will soon be followed by a subsidence of the sensibility of the tissue."

Chromic acid has been well spoken of by Dr. Chandler, who, however, advises caution in its use. The oil of peppermint, tincture of aconite, chloroform, camphor, creasote and other agents of more or less potency, locally applied, either alone or in combination, have also been advocated as being advantageous in some cases.

The hydrate of chloral has also received some commendation as an agent of topical value, but subsequently did not seem to grow in favor. It at first promised much in this direction by its constitutional action, but owing to the danger attending its administration, either internally or hypodermically, and the uncertainty in degree of its effects, is now regarded as an unproper agent in the hands of most.

The sulphate of morphia, in doses of from one-sixteenth to one-quarter of a grain—the latter being the maximum amount—has, in a few instances, been administered by Prof. Kingsbury, the beneficial effects being produced by its sedative action upon the nervous system.

But it has been ascertained, by an experience in the use of the admirably constructed and rapidly revolving burr-engines, in connection with sharp burrs and well-dried-out cavities, that the pain, consequent upon their preparation, is greatly mitigated and made tolerable, even to quite young patients; and that, in some cases, the object has been effected, which, by the old and slow method of operating, seemed almost impossible.

The therapeutic agency of the various remedies for restoring discolored teeth to a natural or nearly natural appearance, still continues to engage the attention of the profession. That a long sought, unobjectionable, and at the same time, potent agent, containing *all* the requirements of success, has not yet been found, or, if found, not generally made known, is evident.

That a comparatively long and tedious process, somewhat uncertain in its issue, is attendant upon the use of most agents, is apparent.

The uncertainty as to the attainment of permanent success, has also limited the practice in this direction to only a modicum of the teeth, which are presented with the impress of death plainly visible upon them, and which are mostly suffered to remain as unsightly specimens of a needed knowledge of an efficient remedy. But, if the process of bleaching teeth can be made to yield good, certain, rapid and permanent results, the profession, and many a patient, will have gained the desideratum so long desired and sought.

The value and efficiency of chlorine as a bleaching agent, has long been known. Could a tooth be subjected to its action as conveniently, thoroughly and fully as are manufactured fabrics of various kinds, the work of bleaching teeth could be readily accomplished.

The difficulty heretofore, has been, to bring a sufficiently large volume of chlorine in contact with the tooth substance and maintain it there continuously enough to produce the result rapidly—consequently, the effect has been transient and the progress very slow—it having been found necessary to repeat the process frequently and for an indefinite length of time, of generating within the cavity a small and inadequate quantity of chlorine, (its action ceasing almost as soon as applied), before partial or entire success could be realized. What was needed, was a continuation of effect. This difficulty has been overcome; and if the permanence of the change produced by the action of bleaching agents can be assured, nothing more in this direction can be desired.

An apparatus for this purpose has recently been devised, and thus far, its use has been attended with gratifying results.

The idea was first presented to us by Dr. C. W. Strang, of Bridgeport, Ct., who acted upon it two years ago, and who asserts that it has never proved a failure in his hands, so far as a removal of the discoloration is concerned. At the same time, it must be admitted that the discoloration is likely to return in some cases, as is probably the fact, if any agent is employed, though there would not appear to be the same degree of liability of its so doing by this mode, as by that formerly adopted—the work being more thorough and very rapid, occupying, so far as experience goes, from ten to fifteen minutes.

A description of the apparatus and the mode of operating it may be of interest, and if any one has made use of the same principle by the same method of practice, it would be interesting to know it.

Since writing the above, with the description following, we have met (in the report of the American Dental Association for 1870, page 143,) with a delineation, by Dr. Atkinson, of an apparatus, consisting of a small, wide-mouthed bottle, with a single bent glass tube running through the

cork, so that the chlorine generated may be applied more easily. This is produced by placing therein black oxide of maganese and hydro-chloric acid—one part of the former to two of the latter.

But the following described apparatus, though perhaps capable of improvement, as is the case with most recently projeeted inventions, does the work well.

It consists of a four-ounce, wide-mouthed bottle, with a cork through which pass *two* small glass tubes. One extending into the bottle about one-half or two-thirds its length, is bent at its emergence from the cork, to which portion is attached a piece of rubber tubing, which is connected with a bulb of the same material of any convenient size. The other glass tube passes just through the cork, not extending below it, and is also bent at the junction of its emergence from the latter.

To this is attached rubber tubing of convenient length, with the end slipped over a small and tapering nozzle or tube, of silver or other metal, or of hard rubber, of the required size at the point, for insertion into the cavity of the tooth. A third perforation through the cork leads to a leather valve on the under-surface.

Having prepared the tooth for bleaching by the usual method, (cleaning out and filling solidly and impermeably, the upper third of the root canal, after preparatory tests and treatments, and the thorough removal of all the decayed dentine in the crown cavity and pulp chamber proper), the manner of operation is as follows: Adjust thereto, a piece of the rubber dam, sufficiently large to keep the chlorine, to be forced into the cavity of the tooth, from being inhaled through the nose or mouth.

A sufficient amount of the chloride of lime, say half an ounce, is put into the bottle, to which is added a proper quantity of acetic acid to generate the chlorine, when the cork containing the tubing is immediately returned to the bottle.

The nozzle or silver point attached to the tubing leading *from* the bottle, is next inserted into the cavity of the tooth. The bulb connected with the tubing leading *into* the bottle, is then operated in the same manner as the bulb of a syringe —the effect being, to force the chlorine *from* the bottle into the tubing leading out of it, and thence into the cavity of the tooth. Though the use of the valve on the under surface of the cork or stopple has a tendency to dilute the chlorine to a slight extent with air, it also prevents the action of the bulb from sucking the chlorine from the cavity of the tooth.

The merit of this method consists in its efficiency, by the simultaneous generation, and continued application of a compartively large volume of chlorine, and the simple nature and working of the apparatus herein described.

A detailed account of the manner of using a saturated solution of oxalic acid in pure water, for the purpose of bleaching teeth, has been fully set forth by Dr. E. A. Bogue, of New York, in Vol. xiv., page 1st, No. 1 of the Dental Cosmos. He says: "When the discoloration is due to the extravasation of blood into the dentinal tubuli, the oxalic acid, being a solvent of the iron, and acting equally well upon the hematine, we need not look further for an antidote." The rapidity of its action—it being only necessary to let it remain in the cavity from three to six minutes, would also seem to commend it to favor. An objection that might apply to the use of oxalic acid, though, perhaps, not a serious one, when proper care is exercised, is the effect it would have in weakening the structure of the tooth.

Would not this apply to the employment of any bleaching agent, if not used with caution, especially in connection with imperfectly calcified teeth? Chlorine is also a powerful solvent, and perhaps it is well to exercise care in its application, though, it is not at all probable that during the short time in which it would be necessary to bring it in contact with the dentine, the structure would be injured.

But chlorine has, perhaps, a greater affinity for diseased organic matter than for inorganic, and therefore, would seize upon the former first, and thus its power to act upon the lime of the tooth be lessened, by being used up in the organic matter.

But oxalic acid has a stronger affinity for the lime salts than has the chlorine, and would, therefore, more rapidly weaken the structure of the tooth.

But is there anything in the mode of action of the two agents which would render one superior to the other in preventing a *return* of the discoloration?

It would seem that neither decolorant has power to prevent the tooth from again assuming an unnatural appearance—and the question occurs, if it does so, may it not possibly be in some cases due to a chemical change in the bleached matter, without regard to influences outside of the tooth itself?

If, when the root and crown filling is as solidly impacted, and as closely adapted to the walls of the cavity as possible, the tooth again becomes discolored, may it not be due to the extravasation, by capillary attraction, of the liquor sanguinis, or fluids with organic matter in solution, into the tubuli radiating from the walls of the pulp cavity?

If the tubules, the largest of which, according to Tomes, is only one ten-thousandth of an inch in diameter, can be traversed by fluids, it is not possible to so perfectly consolidate a filling, and adapt it to the walls of the cavity, as to prevent their passage between the filling and the substance of the tooth, and thence into the tubules.

If this be true, a porous substance, like the oxychloride of zinc, might, by its absorbent qualities, the best fulfil the requirements of a root filling, especially if a tooth once discolored should again become so, and the tissues about the root again assume a morbid condition, and induce a determination of blood to the parts.

Again, if after bleaching, and before filling, the moisture

is not entirely out of the tubuli, or out of the decolorized matter within them, and it is afterwards somehow dried out or removed, perhaps by absorption, into an oxychloride filling, would not the matter in the tubuli, by shrinkage, afford room for the absorption of more dead matter?

Is it not also possible, if the dentine has softened, and partial disorganization of the structure has taken place, for dead matter to be absorbed through the periphery of the root, and about the neck, at the termination of the enamel? So it would seem.

But to render this possible, must there be such a deterioration of tooth structure as to be fatal to its permanence?

It would seem that in regard to dead teeth of long standing, where the vitality has been destroyed in youth, before the tooth structure had become thoroughly calcified, or attained to its maximum degree of hardness and density, there would be a greater liability, after bleaching, of a return of the discoloration, than when the dentine had acquired greater density.

In the teeth of young subjects, the tubules are also larger, and more easily traversed by fluids, and therefore more readily discolored, when the circulation is suddenly arrested, and they undergo stagnation (stasis,) and decomposition.

When in young teeth this loss of vitality occurs, (and the structure becomes partially disorganized and broken up, and decomposition of the animal matter takes place,) though the bleaching may, owing to the larger size of the dentinal tubuli, be accomplished more easily than in older subjects, it is our opinion that a permanent maintenance of the restoration cannot be as confidently looked for.

The following is the substance of some ideas bearing upon the subject, and inferences derived from them, condensed from an article by Prof. Stellwagen, in Vol. xii. of the Cosmos: In regard to the colors or stains in teeth, if they are vegetable, which are due to compounds of hydrogen,

chlorine, by union with these, will destroy the color-forming chlorohydric acid. The use of oxalic acid is indicated when the discoloration is due to tannate of iron, formed by the contact of iron or steel with tannin, or to the iron in the hematine or coloring matter of the blood, or to the oxidation or decomposition of base metallic substances used as fillings. The acid must be employed cautiously, lest the effect upon the teeth be injurious, and be followed by thorough washing, to remove all traces of the acid, on account of the liability of the color to return, should they be immersed in an alkali.

To remove or dissolve the deposit in the tubuli, when water will not answer, with repeated syringings, well-diluted nitric acid is useful, but this must be removed immediately, and any remaining acid neutralized by an alkali, as ammonia water.

This is also useful for removing the stains of iodine.

But here we leave the subject.

For alveolar abscess, disinfecting root canals, etc., the new remedy, glycerole of thymol, which was briefly reported on at the last meeting of the Association, by Dr. W. H. Atkinson, has been highly extolled by some, as fulfilling the indications of creasote, without its objections. Others have asserted that simple glycerine is equally efficient. Still others, that while it answers a very good purpose for some things, it does not effect all that is claimed for it.

There is, doubtless, a tendency to overrate the value of a remedy upon its first introduction. Of its merits, our personal experience would not warrant us in giving an opinion.

Some of the old and well-tried remedies having answered our purpose admirably, we have been waiting for the conclusions of men better fitted for conducting experiments and investigations, so that we can only gather a few hints from the experiences of others.

Chemically, thymol is a part of an essential oil, isomeric with cymglic alcohol, and homologous with phenol—of a

nature similar to creasote and carbolic acid, and though resembling them in its action, presents, according to Tomes, distinct differences.

It has sedative, antiseptic, disinfectant, and in an undiluted state, slightly caustic properties.

It is obtained by fractional distillation from Thyme oil, of which it forms about one-half, the more volatile portion also containing considerable quantities. Thymol is likewise obtained from the volatile oil of horse-mint, and from an East Indian umbelliferous plant called Ptychotis Ajonan, by fractional distillation and re-crystallization.

Thymol has a mild odor, which, (according to Lallemand,) is quite distinct from that of thyme oil, and an aromatic peppery taste; it is employed in dental practice in combination with alcohol and glycerine, in which it is soluble.

It is likewise readily soluble in alcohol, from which it is not precipitated by dilution with water, and in ether, acetic acid, and three hundred parts of water.

Tomes, the value of whose observations none will deny, says, in relation to this agent, that as a sedative to the pulp of an aching tooth, it is superior to carbolic acid.

But this is not always the case: sometimes the reverse is true.

He also says: "I have, of late, been using nothing but thymol, as a dressing in the fangs of teeth of which the nerve has died or been destroyed; on removing the wool or floss silk on which it has been applied, even after two months, the odor of thymol has been as strong as when first put in, though the wool has blackened by discharges; and I am inclined to think that its effect is more lasting than that of carbolic acid, but it takes a very long time to ascertain, with certainty, the practical value of a remedy; and it cannot be conclusively ascertained, until it has been used by a large number of practitioners."

Would not the fact, that the odor of the thymol *remains* with the floss silk with which it is saturated and carried into

the root, indicate that it does not do its work as thoroughly as creasote? not being absorbed by the structure of the tooth, or by the diseased tissue about the root through the apicial foramen.

If creasote or carbolic acid, be used in the same manner, the odor will, in most cases, be found, on removing the silk or cotton, to have mostly or quite disappeared after a few applications, sometimes one, and no discolorations of the silk will be noticed, owing to a change in the character and condition of the tissue about the root; if the silk does not part with the odor of the thymol, does it part with the active and efficient portion of it? If the odor of carbolic acid, the most powerful disinfectant known, disappears from the silk which carries it into the root canal, while that of the thymol remains, though the latter is of a similar nature, the circumstance would indicate the greater efficiency of the former for the purpose specified, in that the effect is not only more potent but more lasting, because of its greater thoroughness.

Thymilic acid has been recommended by M. Bouilhon, a French chemist, as a substitute for creasote and carbolic acid, in all cases where their use as a therapeutic agent is indicated, for the reason that its odor and taste are more agreeable.

In chronic cases of abscessed bicuspids and molars, where the roots pierce the floor of the antrum, or the destruction of the process affords a channel into it, making the injection of caustic agents somewhat objectionable, from the liability of finding their way into the cavity, and producing irritation of the living membrane, the glycerole of thymol, being milder in its action then creasote, may be preferable, though the latter can be diluted to meet various indications.

It might also be more useful in recent cases of alveolar abscess, than in those of long standing, where, perhaps, a more powerful agent would be more effectual.

It would be difficult to improve on creasote, *i. e.*, to find an agent that will meet such a variety of indications, varied in its action as it may be, either by its use in full strength,

diluted, or in combination with a large number of substances, possessing, as it does, stimulant, narcotic, irritant, styptic, antiseptic, caustic and escharotic properties.

The glycerole of thymol has, however, been found efficient in many cases of incipient alveolar abscess, or periostitis, by an application of the agent on cotton to the gum over the seat of the inflammation.

It seems to act by absorption through the tissues, and also as a rubefacient. By the addition of a few drops of chloroform, its action seems to be intensified. In this direction it may prove a valuable adjunct to dental therapeutics.

As but little has appeared since the last report concerning the efficiency of thymol, for the purposes for which it has been recommended in dental practice, or the views and experiences of the profession in this direction, it is not necessary to enlarge.

But in cases of alveolar abscess, complicated with caries of the maxilla, sulphuric acid, or the elixir of vitriol, is an important therapeutic agent; it has an advantage over the chloride of lime, in that it is confined in its action to the dead tissues, dissolving out the carious bone and leaving instead the living, and thus doing away with the tediousness and pain attendant upon surgical interference; in addition to this, the application is comparatively painless, and produces but little if any irritation; it also, by its antiseptic qualities, alters the character of the discharges, and promotes the growth of healthy granulations. But were the action of the acid not limited to the dead tissue, the vital structures would not suffer to any injurious extent, because the dead portion would be attacked first, owing to the greater affinity of the acid for the latter.

Its effects would also be neutralized by contact with the lime in the carious or ulcerised bone, especially if the latter were of considerable extent.

Pollock, an English surgeon, by a series of experiments with diseased, dead and living bones, having subjected por-

tions of each to the action of sulphuric acid and water, one part of the former to three of the latter, at a temperature of 100° for three days, found that in the healthy bone no action took place, while the specimens of diseased and dead bone were each dissolved in the mixture, *seemingly* proving that the acid, if diluted, does not affect the healthy hard and soft tissues, but chemically acts on the diseased bone alone. Sloughing of the soft tissues, as well as the destruction of the diseased bone, will be produced by the action of caustic potash, and so it is, if the chloride of zinc is used in too great strength.

In cases of alveolar abscess, where there is softening and breaking down of the alveolar plate, the removal of these dead portions, either by dissolving them out, or by cutting, is necessary, in order that the benefit resulting from the treatment of the abscess proper may be realized; and when the apex of the root presents a ragged surface, it may, if it is not amputated, rounded off and polished, *after* being solidly *filled*, prove a source of irritation, and prevent the healthy growth of new tissues.

The employment of dilute acids, for cleansing teeth in dental practice, has recently caused some discussion in certain quarters, opinions, for and against the practice, having been expressed by men of high attainments in our profession.

It had been supposed that this question was long ago settled, by the universal condemnation of the practice.

"Who shall decide, when doctors disagree?" One of these, though admitting the destructive effects of the mineral acids upon the teeth, owing to their strong affinity for the organic portions, nevertheless recommends their use with *extreme care*, the care to be manifested, by the limitation of dilute nitro-muriatic acid, combined with silica and oil of gaultheria, to the portion desired to be cleansed, and the immediate and frequent washing of the mouth with alkalies, and the subsequent instrumental polishing of the surface.

Still another advocates the use of dilute sulphuric acid in

connection with rapid friction with stick and pumice, *after* the mechanical removal of the greater portion of the calcareous deposit; the principle being, that the acid, first seizing upon what remains of the latter, its power for evil is neutralized and used up, before it has time to act upon the structure of the tooth.

Others of equal ability condemn the practice *in toto*, on the ground that the mischief is done, by the corrosion of the surface of the cementum and enamel by the acid, before its action can be neutralized by the use of an alkali.

If, as is claimed by some, dilute acids do not act upon healthy bone, then it would *appear* to be harmless in this case.

But, were an application made to carious bone, the effect would not be serious, were the healthy surface also acted upon to a slight extent. But this would not hold good with regard to the teeth.

That there are many teeth, in which the surface of the enamel is rough, or full of delicate pits or depressions and imperfections, which it is almost impossible to clean by the usual method, has, doubtless, been verified in the practice of every one; also, that a removal of the deposits in these minute pits, cannot well be accomplished by means of sticks and powders; neither by the use of delicate steel instruments, without producing more injury than benefit, because the pits cannot be left with polished surfaces.

So that, while the reasons antagonistic to the use of acids in this direction, seem to greatly preponderate, *some* may be adduced in favor of the practice.

The subject is one calling for serious consideration, and it is evident that the practice, if universally adopted, would eventuate in the destruction of countless numbers of teeth.

Granting that such an agent might be safely employed, if *extreme* care were exercised, it is well known that *extreme* care is too likely to go unemployed in many cases, and in such the want of it would be more disastrous and incapable

of repair than in many others. From which we may infer, that the use of dilute acids in cleansing teeth, should be very limited, if indeed their employment were ever admissable or proper.

But it is not proposed to further extend this report, or weary your patience by remarks, or suggestions concerning the value, action and effects of the agents employed, or proper to be employed, in dental practice. Were this possible, within reasonable limits, the duty *should* devolve upon those capable of imparting instruction.

Personally, we have felt inadequate and incompetent for the task to which we have been assigned, but, nevertheless, would not shirk what may be considered duty; and though this report may be lacking in depth, comprehensiveness and force, furnishing but little mental pabulum, it is hoped that the reserved forces of mind and matter, in our profession, will unite in supplying all deficiencies.

DISCUSSIONS.

DENTAL THERAPEUTICS.

DR. TRUMAN—While I accord to the gentleman credit for his work, I take exceptions to some points in the report. I find that he takes the same view substantially as Dr. Summers in regard to the action of alkalies upon the teeth. Now I differ with him entirely on this point. I do not believe that alkalies have an injurious effect upon teeth. If this were so, why do we always find an acid condition of the mouth along with decay? The lower incisors seldom decay, owing to the alkaline condition of the saliva in which they are constantly bathed. Do we ever find decay where an acid condition of the mouth has not preceded it? Consequently, we find it most frequently in the proximal surfaces, for I hold that this acid condition is produced by other causes than the secretions of the mouth. I maintain that it is to a large extent due to the growth of fungi. They increase and develop acid. And what produces sensitive dentine? Never an alkaline—always an acid condition of the mouth. There is no better remedy than escharotic applications and temporary fillings. If the secretions are kept out, the sensitiveness will be relieved.

In regard to capping the pulp with oxychloride of zinc, I was very much pleased some time ago in reading an article in the *Cosmos*, which recommended using the oxide of zinc with carbolic acid before applying the oxychloride. I have found this suggestion a very valuable one. All pain ceases

at once. I cannot recall a single instance where the pain was protracted after the operation.

A MEMBER—Does it crystallize?

DR. TRUMAN—No, but it does get hard. I don't believe, however, that it has been applied with entire success in syphilitic or scrofulous conditions of the mouth.

And now, as to bleaching teeth. This subject has greatly interested me. Though the paper does not mention it, my experiment seven or eight years ago, of mixing chlorinated lime with acetic acid, was a perfect success. When rightly performed, it will never fail. He quotes from a paper which took my results, which I worked out at that time. Now I cannot believe that chlorine will bleach in fifteen minutes. I have in that time bleached with acetic acid and and chlorinated lime. It takes a great deal of time for all the other agents usually employed to act. I have never had any success with oxalic acid. Nitric acid turns the tooth yellow, and this is difficult to remove, and even when removed, the discoloration will return. In regard to the use of acids, I do think that the recommendation of cleaning teeth by acids belongs to the dark ages. It seems to me impossible to believe that here in the nineteenth century such a thing should be countenanced. If we make a microscopical section of the tooth, and subject it to the action of one part sulphuric acid and one part water, we will find that it will destroy the tooth substance. This is enough to show that it ought not to be used. I think the indiscriminate use of medicines by physicians ought to be protested against. It is alarming to see how many children's teeth are destroyed in the city of Philadelphia by the administration of medicines that act upon the dental tissues. I should like to have a paper, prepared coming from this Association, on this subject.

DR. BUTLER—In reference to using acids in bleaching teeth:

I object to this *in toto*, or anything that affects the integrity of the tooth substance. Discoloration is principally confined to dead teeth, not to the enamel, and any one who determines to have teeth cleaned essays too much. If I were to attempt to restore the color of the teeth, I would cut away, rather than eat it out with an acid. You may say that this will weaken the tooth substance, but that which remains is better than that which has been operated on by chemical agents. Now I assert that it will take four weeks to clean a tooth with acetic acid; and you need not put anything with it, for it will accomplish the work just as well by itself. The best treatment is to cut away as much as is necessary, whitewash with oxychloride of zinc, and then fill with gold.

DR. TRUMAN—My experience is the reverse of that altogether. Of course there can be no action unless the acid is in excess, to set free the chlorine. I have kept it for three or four months in teeth without the slightest injury. I have performed perfect experiments on delicate front teeth.

DR. WEATHERBEE—I have made several attempts, many years since, in the use of chlorinated lime for bleaching teeth, with apparently good results, before filling, but I know of no exception to the return of the discoloration. I therefore, abandoned it. For twelve years I have used the spirits of camphor, very strong. It is a very effective agent, and produces better results than anything I have used. I like the remarks of the paper very much indeed, however, as they seem to be statements of sterling facts. I am surprised that Dr. Truman has failed so frequently in the use of the oxychloride of zinc. To me this is a stumbling-block. It cannot be because it is done carelessly, and if it is done in the best possible manner, who shall believe when doctors disagree? If, however, the failures are the exceptions, we are bound to follow those who have succeeded. In one or two cases in which I have used the oxychloride to

save the pulp, they were perfect failures. Not but what I took pains, for I did it as well as I could, and if others have succeeded in similar cases, they have done more than I can do. Where the inflammation of the pulp has gone on to suppuration, I do not believe it is possible to do any great service in this direction.

Now, I must take exception to the use of dilute acids for cleaning teeth. Why are they necessary, in the first place? I believe that they are totally and absolutely unnecessary. If the acid is strong enough to dissolve calculi, they are strong enough to dissolve the tooth substance. Do we then use them without culpability? I think I know enough of the evil effects of acids upon the teeth, not to apply them to my own teeth, and those of others. If you say you cannot reach them with instruments, I reply, manufacture instruments that will. I've got them, and if you'll come to Boston, I'll show them to you. In the case of the inferior incisors, for instance, I can carry them down to the end of the root, without breaking the gum.

Dr. Crouse—I have taken teeth covered with tartar, and put them in aromatic sulphuric acid, and it wouldn't remove it. It was a total failure. Now as to the oxychloride I agree with Dr. Weatherbee: I cannot see why gentlemen make so many failures. I know there is but little trouble in its application, and forty-nine out of fifty cases succeed. I have used it for two or three years, and have had no reports of alveolar abscesses in consequence. By using the rubber dam I can make the application with but little pain to the patent.

Dr. Osmond—In regard to the use of acids in cleaning teeth. I would like to relate a little incident that occurred in Cincinnati. There were at the time of which I speak certain mountebanks going about through the city, who were called curb-stone dentists. They sold a tooth powder with which they professed to clean the teeth so as to make

them perfectly white. They applied it with pledgets of Canton flannel, and after rubbing them over a few times with the powder, sure enough, there was a fine white set of teeth, and "all for twenty-five cents." I took occasion to examine into this matter, and exposed them through the papers. After the application, the teeth became exquisitely sensitive. In seeking for an explanation of this, I found that the powder was inert, but that the pledgets had been wet with strong sulphuric acid. The *modus operandi* having been developed, their trade was broken up.

DR. THOMAS—I would call attention to the manner of preparing cavities with oxychloride of zinc. I have succeeded in my experiments to a certain extent, but have had failures. There are various ways adopted for the use of this agent. The one that I wish to propose is this: Saturate the cavity well with creasote. Now saturate a thin piece of paper with carbolic acid, or creosote, and place it over the exposed pulp, then the oxychloride over that. I have yet to know of the first failure in this mode of application. A great many use collodion. This gives the same trouble as the glycerole of thymol; its application involves too much pain. If there is any better or surer method of application, I would like to know it.

SECOND DAY—EVENING SESSION.

DR. CARROLL wished to know what had been the experience of the profession in the use of Guilloi's cement. He had abandoned oxychlorate of zinc, and had found in the cement his expectations more than met.

DR. BOGUE wished to know what Guilloi's cement was.

DR. CARROLL said it was like the oxide of zinc in appearance, and the solvent was like the chloride.

DR. BOGUE said the profession was occupying a false position in using those substances, the composition of which they did not know.

REPORT

ON

DENTAL PHYSIOLOGY.

BY M. S. DEAN.

The subject of Physiology, when restricted to the organs of mastication, is confined within narrow limits. And though the scope of the Physiologist is much circumscribed here, and the field for examination comparatively small, and to the mass of the profession possessing little that is of startling interest, yet this branch of the subject has features, the very difficulty of clearly distinguishing which, perhaps, intensifies their interest to the scientific dentist.

Microscopy, in this field perhaps, to a greater extent than in any other, has aided the researches of the physiologist. And yet, the mode by which nutrition and sensation are transmitted to the dental tissues, is a question, at the present day, which is far from being satisfactorily settled. Of the theories that have been presented, none, as yet, seems to have been entirely satisfactory, even to the author thereof. The precise characteristics of the medium through which sensation is transmitted from the dentine to the dental nerve, have puzzled the brains and eluded the vigilance of the closest observers, and still remain an unsolved mystery. The doctrine that the nerve fibrils enter the numerous tubuli of the dentine would appear to be the most rational one yet presented; and as the anatomical structure of the tooth favors this theory, it is the one which is the most naturally and generally adopted by physiolo-

gists. But notwithstanding the evidence which has been adduced in support of this theory, when we come to consider how readily the nerve pulp is separated from the walls of the canal, the evidence of our senses, unaided, would seem sufficient to refute this hypothesis.

As has been observed by Prof. McQuillen, the nerve pulp, in some young animals, when detached near the foramen, and the points where dentification first commenced, will drop from its tubular walls by its own weight. This surely could not be the case if the thousands of nerve fibrils, even after divesting themselves of their neurilemmas, entered and ramified in the substance of the dentine. And, if these fibrils possess sufficient tenacity to be drawn from the tubuli (as is claimed) it must require considerable force to draw out even one of these many fibrils from its sinuous tubulus.

Quite recently a theory has been advanced which differs totally from any which has hitherto been broached, and deserves our careful consideration, even if it be found untenable. For, if this theory prove to be only a specious one, the *facts* upon which it is founded, may be of great value in disclosing the true one. This theory is further worthy of our notice from the fact that it is the result of considerable study and careful experiment by one whose reputation for close and correct observation is well and favorably known to the profession. And, although the writer is slow to accept any new doctrine without the fullest demonstration of its soundness, yet he believes the experiments made by Dr. W. W. Allport—the author of this new theory—as shown to several distinguished members of the profession, as well as to the writer, are such as tend to sustain his theory.

The facts are these: when the pulp attachment, at the point or points where dentification first takes place, is severed, the dentine is totally deprived of sensitivity. When there are four such attachments existing, as is usually the case in the inferior molars, the severing of one of these destroys the sensitiveness of about one-fourth of the dentine of

the tooth which, previous to this separation, exhibited extreme sensitiveness to the touch of the instrument. At the same time the remaining three-fourths continue as before, highly sensitive, the line of demarcation between the sensitive and non-sensitive portion of the tooth being clearly defined.

If these experiments are reliable—a matter which is by no means a difficult one to test—dentinal fibrils must be distributed from these points (or "placental attachments" as the author terms them) wherever sensitiveness is found in the dentine.

The substance through which (or *along* which) these fibrils pass, in order to reach the dentine remote from the points of attachment, is, as yet, merely cojectural: and no theory has been suggested that is at all satisfactory to the writer.

It would seem an impossibility for the nerve fibrils to pass down through or by the side of the preformative membrane and thence be distributed to the tubuli; and yet, this view meets with considerable favor by the author of this theory.

In briefly presenting these crude facts to this body, even though he be unable to explain their physiological bearing, the writer believes he has partially performed the duty assigned him, viz.: "To report such new matter—collected from all sources at his command—as *may* be of profit to the Association."

DISCUSSIONS.

DENTAL PHYSIOLOGY.

PROF. JUDD—I rise to bring to notice the paper of Dr. Dean, which dwelt, to some extent, upon the theory of Dr. Allport. This theory being a new one, and some being present, who, perhaps, are not perfectly familiar with it, I will state it in as few words as I can. It is based upon certain observations which he has made upon the tooth substance. First, he notices a close connection between the pulp at the point where dentification commences, and the tooth substance. At all other points, the connection, if any, is exceedingly loose. It is claimed by Dr. Allport, that there is none, and that the innervation passes only through the initial point of dentification.

DR. DICKERMAN—Dr. Robinson said so six or eight years ago.

PROF. JUDD—If he did then, Dr. Allport will not claim the discovery.

In arriving at definite conclusions upon these points, we have to examine not only the histology of the tooth, but we have to take cognizance of other parts of the system. Our knowledge would, indeed, be very limited and imperfect, if we could not carry out our investigations into other parts of the system, where we can obtain more accurate and definite results. Take for example, inflammation. We are obliged, in order to see its processes as they are going on, to take the wing of a bat, the mesentery, or foot of a frog, where we can get a closer view. Now it is claimed by Dr. Allport

that if you take a tooth having four cornua, and cut off one of the cornua, the sensitiveness of one-fourth of the tooth will be destroyed; cut off two, and that of one-half will be gone, and so on. He claims to have proved this, and his conclusions in regard to this effect, have been corroborated by subsequent experiments and observations. Now we must shape our theories to explain phenonena as they are observed. In order to look clearly at this, we must note the changes which have been made in our theories. We were once taught that the nerve fibers never penetrated the cornua; but now, we know that they do. Again, it was once supposed that the nerve fibers never penetrated the sarcolemma; but we find that on the sheath is a little eminence which looks as though it was made by the puckering of the sheath at that point. Into this the axis cylinder is seen to pass, and the eminence was called the *Doyerian* eminence. We now know that nerve fibers do go where they were long supposed not to be present. It was long taught that no nerve fibers even penetrated the epidermis; but it has been lately shown that they do pass up into the malpighian portion. It was for a long time thought that they terminated in loops; but it has been shown that they pass in between the cells. It is claimed that they come in from every direction, and pass into the dentinal tubuli. It has never been claimed that a nerve, with its medullary substance or neurilemma, passes in, but only the axis cylinder. The former are not essential to the functional activity of the nerve. The cylinder is a fibrous structure of extreme tenuity and no tenacity, and were there millions of them stretched across, from the tubuli to the pulp, they would be but a gossamer web. Now if these only pass in at this point, one of two things must be true—either they must be distributed by ramification, or they must return through the pulp canal and thence be distributed to the tubuli. The pulp of the tooth lying in the neck, it would be exceedingly difficult to arrive at certainty in our experiments. It would also be exceedingly difficult to

cut off the cornual points without disturbing the connections, which would account for the loss of sensitiveness.

PROF. TRUMAN said—The idea that cutting off the horns will destroy the sensation, is indeed something new. That the axis cylinder does not pass through I cannot believe, because it is contrary to Beale, Ball, and other eminent microscopists. My own observations also have confirmed their view. When we take a section and examine it with the microscope, we can distinctly see the axis cylinder. If we take a section and cut out all the inorganic matter with hydrochloric acid, we will have the pulp with the nerve fibres at the margin. Where do they belong? In the tubuli to supply the dentine. Such is the view of Kolliker, McShultz, and others. If they then take this ground is it not asking too much of us to set aside such authority? I am satisfied if the proper examinations were made, they would be confirmed in their conclusions by those who now take issue with them. Statements should not be made unless they are based upon actually observed facts. I am tired of these experiments which come up to us every year, setting aside all the observations of the past, and claiming our endorsement. It is high time we were arriving at some settled conclusions.

DR. WEATHERBEE—I have observed facts that militate against this theory. In the first place look at the tooth where the grinding surface has been worn down by attrition—a central incisor, for instance, which has been worn down to the margin of the gum. Now does the normal condition of nature, which protects the pulp, continue in the cases referred to? I think it is decidedly interfered with. And again, where the pulp has been excised, Dr. Allport claims that he saved the life of the tooth, and it remains as good as ever.

DR. CUSHING—Dr. Allport did not cut off the cornua at the point of attachment.

DR. WEATHERBEE—Did he claim a renewal of the tissue?

DR. CUSHING—Yes.

DR. WEATHERBEE—Calcification takes place, and if you cut into the part you will find it exceedingly sensitive. Now has this gone on in harmony with the protective principle of nature? Take the first superior bicuspid with a bifurcated root. Suppose the pulp in one is dead, and in the other calcified? If you cut through you will find one-eighth of an inch living pulp, and that department is very sensitive. Now has nature preserved her integrity? Again, take a tooth which has been removed. Split it, and you find very few attachments. May not the majority of the fibrils have collapsed in extraction? That they do not appear is no proof that they do not exist, for they have been seen here in all their beauty.

PROF. JUDD—There is one point in Prof. Truman's remarks, to which I would call attention. In his statement concerning broken sections he referred to the observations of Beale and others, which seem to set aside the view of Tomes. But it is to be remarked that Tomes never claimed that these fibers are not axis cylinders. It was shown by Ball that there were two kinds of fibers projecting from the pulp. One kind were really fibers, the others were processes of the pulp substance, and these projected into the tubuli. Two or three years ago I demonstrated that they could pass into the tubuli. In relation to those specimens which show projections, we remark, that though they are common they fail to enlighten us on the part from which they were taken. That point might be the cornua. The connection is undoubted at these points, and if there is any other connection, it is exceedingly slight. The function of the connective tissue seems to be, to sustain the pulp in its position and prevent these axis cylinders from breaking.

DR. BOGUE—Dr. Allport experimented on my tooth, an

upper bicuspid. The section which he made was broken apart and fibrillæ were seen stretching from portion to portion, but I don't know what they were composed of. It might have been a *post mortem* product or medullar matter. I once had occasion to remove the pulp of a central incisor. I applied arsenic; cut off the pulp and proved the connection between the periphery of the dentine and the pulp. Ball observed the transition, but he does not pretend to say that the processes extended out from the cornua alone. He states the same facts which were related by Prof. Judd. He no where asserts that they are nerve fibres.

DR. MCQUILLEN said he had an opportunity of examining the specimen referred to by Dr. Bogue; it having been presented to him by Dr. Allport. In addition to that, he had made sections himself in which the fibrillæ could be readily seen. He had suggested that this might be a *post mortem* result, but did not wish to be considered however as positively committed to that theory; on the contrary was perfectly willing to accept them as nerve fibres when conclusive evidence was offered. He did not tire of experiments and the discussion of this subject as some had, but was willing to "labor and to *wait*." There was one direction in which he had worked on this subject with as yet only negative results, and he wished to know if any one present had done anything that way and met with success. He alluded to the microscopical examination of the dentine cut from exquisitely sensitive teeth. If, as was claimed, the pain experienced by the contact of an excavater was due to the presence of nerve fibers in the dentinal tubuli, it was reasonable to infer that they should be found in the cuttings from the sensitive part of a living tooth, placed under the microscope. He had over and again made such examinations immediately on the removal of decayed and healthy portions from a cavity prior to the introduction of a filling. He did not present these negative results as conclusive evidence. On the contrary, it was his intention to continue the

investigation, and he would suggest to others the propriety of doing the same thing. In connection with this matter it would not be amiss to state that the presence of nerves could be readily demonstrated under the microscope, in the soft parts, whether the section was taken from a living body (as in an amputation or an accident) or a corpse; the Pacinian bodies, and the nerve fibres connected with them, of the hands and feet, for instance.

DR. BOGUE—Give us the process by which you experimented thus upon a *live* tooth.

DR. MCQUILLEN replied that there was somatic death, or death of a living being, and molecular death or the death of a part. Thus a portion of muscle, taken from an animal, just killed, and examined under the microscope, will contract when irritated, for some time, owing to the maintenance of molecular life. With respect to the examination of cuttings from a living tooth, there was no difficulty in that matter to one who was in the daily use of the microscope. With a keen excavater thin cuttings could be readily made. Place these on a glass slide in a drop of glycerine, then put on the thin glass cover, and the preparation would be ready for examination. He had no difficulty in distinguishing the dentinal tubuli and inter-globular spaces in this way, but could not find the dentinal fibrilla in these cuttings. In examining the structure of a tooth it was not always necessary to have a longitudinal or transverse section of the entire tooth. A part, and an exceedingly small one, in most instances, was all that was required. By breaking a tooth in a vise or mortar, and taking a fine shaving with a sharp knife or chisel, good specimens for examination could be secured.

DR. BUTLER—With microscopes from five to eighteen hundred diameters it has been impossible to demonstrate the point in question. Now I don't believe the nerve fibres pass into the dentine. One thing I do know, however, that

the dentine is sensitive. Whether Dr. Allport's theory is correct or not, we know that at the cornua we get the greatest sensitiveness. If they run into the tubuli they must be exceedingly delicate, and it is not an easy matter to demonstrate them. If these little fibrillæ connect, the connection is very slight. Again, the source of nourishment is cut off from the tubuli if they do not penetrate them.

DR. HITCHCOCK—I am not surprised that Prof. McQuillen obtained negative results. I tried Tomes' experiment and could get no definite results. I have, however, taken a freshly extracted molar, cracked it open, removed the pulp, placed a part of it in glycerine and water with a little carbolic acid, and after two trials, I got a portion which showed a prolongation. I have also some teeth of puppies, sections of which showed first a circle of dentine; second, dentinal cells of an oval shape, and processes extending into the tubes. I could also see the fibres. I have a section presented to me by Tomes which illustrates this finely. Ball found two sets of fibres, one of which he traced directly into the tooth structure. Newman says that these cells may have several fibrillæ. Another class is described as long prolongations, ramifying about the dentinal tubes, and lying curled up loosely among the dentinal fibers. He thinks they must run into the tubes, as there is no room for them elsewhere.

PROF. MCQUILLEN—I have succeeded in doing what Tomes did. I have also a specimen like that referred to by Dr. Bogue, given me by Prof. Leidy.

THIRD DAY—MORNING SESSION

DISCUSSIONS—MISCELLANEOUS.

The resolution of Prof. Truman, in regard to the relief of the family of Dr. Horace Wells, having been offered for

action of this body, DR. ATKINSON said: It is painful for me to disagree with my brethren at all times, but especially in a case like this, and yet I am forced to pronounce the truth. We claim that Truth was wounded in the house of her friends, when Congress took the action in reference to this matter, that it did. Now I cannot give my vote to this resolution for reasons other than humanitarian. Anæsthesia is of the devil, and you had better enter a *caveat* right here. I will not give my vote to the value of anæsthesia, or any other satanic influence that deprives a man of the capacity to recognize law. I wish there were no such thing as *anæsthesia*; I am against these satanic agencies which prevent men from going through what God intended them to go through. My affections are with you, but not my higher nature.

DR. WETHERBEE—Upon a similar occasion, I had the honor of presenting resolutions of a like purport with this, and they were carried with the *aye* of the gentleman who has taken his seat. To-day he tells us that his "affections are with us but not his higher nature." Now I favor this resolution in the first place, because of the comparative need of the family. In doing for them, we honor the memory of its head, and discharge a duty devolving upon us. And in the second place, I favor it, because I favor anæsthesia, at the proper times and under proper circumstances. There are but a few who do not use it; and if it is from the source to which it is attributed by Dr. Atkinson, then we must believe that he has been in the very front rank of human benefactors, in proclaiming against it; and for this good act, we will give him the credit that is due. But I differ from him entirely.

REPORT

ON

OPERATIVE DENTISTRY.

C. E. FRANCIS, CHAIRMAN.

Operative Dentistry is the department of our specialty that most directly interests every practitioner. Anything of practical value referring to it, whether written or uttered, will always find ready eyes and ears. We seem never to tire of essays or discussions upon anything pertaining to it—indeed it is the prominent, the important feature of our calling.

Whatever may be our theories upon scientific topics, without a truly and thoroughly *practical* knowledge of the principles underlying dental practice, efforts to benefit our patients are of little avail.

As a profession, we claim a position of great usefulness to mankind. We declare, and have demonstrated the fact, that dentistry has added health, comfort, and length of days to human beings; and, everything considered, it may safely be asserted that no profession can more materially benefit the race than can ours. It is, nevertheless, a fact to be deplored, that a large proportion of dental operators are imperfectly fitted for the duties they assume; yet even they who grope in the darkest paths are gradually becoming more illuminated, as the light shed by this, and the numerous other associations throughout the land, penetrates their shadowy recesses.

As time moves on, and the historical years roll over our

profession, we are encouraged by the healthful advances it has made. Associated professional intercourse, the im-improved condition of our dental schools, the greater thoroughness of teaching by private preceptors, and the excellent dental journals scattered broadcast, have all done their share in the good work of elevating its standard and increasing its usefulness.

To report upon "Operative Dentistry" is to traverse a broad field. Many have already explored it, and we who follow can hardly avoid treading in their footprints. Your committee can simply review the field, and notice such points as come more directly within the sphere of their observation.

First. To fulfil the requirements of our specialty, a thorough theoretical and practical knowledge is requisite of all that pertains to it; but as this matter will be treated by the committee on "Dental Education," suggestions here seem unnecessary. *Second.* To properly perform operations upon the teeth, suitable instruments adapted to ordinary and special cases are needed. Not wishing to invade the province or usurp the duties of another committee, this report will simply make reference to a few instruments or appliances of recent date. *Third.* Early care, cleanliness, etc. Upon the principle that an ounce of prevention is equivalent to twelve or sixteen of cure, the dental surgeon should use his best endeavors to save teeth by *preventing* decay. Much may be accomplished in this direction where due effort is made. The mass of mankind know little of the importance of giving their dental organs timely care, or of the necessity of attending to their children's teeth early in life. Your committee believe that a sound and healthy denture may be insured to nearly every member of the human family if early precaution and persistent care are observed by both dentist and patient. Innumerable instances noted, have given such evidence as to confirm this belief. Children of delicate constitutions, with teeth poorly organized or deficient in lime salts—teeth that would seem

to melt away in a brief time, have been so well treated and cared for, that they have remained to perform their appointed functions for many long years.

Early attention to children's teeth, we therefore consider as the foundation stone of a successful dental practice, and to educate the public to appreciate this fact should be our aim. We have much to do in the way of imparting such instruction, and unless we do this we neglect one of the principal duties devolving upon us. Hygienic laws need be studied and taught until carefully comprehended by everybody. Suggestions regarding the physical improvement of our juvenile patients can probably be given with more correct views of their application by the intelligent and observing dental surgeon than by any other adviser.

Our first effort with young children is to secure their confidence. As first impressions are usually stamped indelibly upon their minds, it is well to convince them by patience and kindness, of our good intentions in their behalf. Cleanliness is next to Godlines, and this principle should be instilled into their very being. After the teeth are divested of the cloudy coats of decomposed mucus or patches of salivary calculus, it is important that they be *kept* thoroughly cleansed. Every spot of superficial decay should be obliterated, and every cavity excavated and filled. Our little patients are then secure from the tortures of odontalgia which so frequently rob them of sleep and rest, and fearfully tax their nervous organism. They are also ensured the use of their teeth in preparing their food for their nourishment, and no chance is offered for noxious vapors to generate, as when caries abounds.

Again, by retaining the dental arches unbroken, they so develope and expand as to ensure a greater degree of regularity in the arrangement of the permanent teeth than if prematurely disturbed or mutilated. We believe the profession, as a whole, are continually becoming more thoroughly convinced of the importance of preserving the deciduous teeth, and are acting in accordance with such convictions.

Removal and prevention of superficial caries in permanent teeth.—Your committee are of opinion that more attention has been given by the profession to this matter within the last twelve months than in any previous year. We owe much to Doctor Robt. Arthur, of Baltimore, not only for many valuable suggestions imparted, but for the courage and perseverence he has manifested in battling against prejudice. If this committee are not as yet fully prepared to endorse all that Doctor Arthur has written or stated in regard to cutting away the proximate faces of the teeth, they certainy believe that his method is worth considering, and would commend his recent work, entitled, "*Treatment and Prevention of Decay*" to the careful perusal of every member of the profession.

As for superficial caries, the sooner removed the better, by files and chisels or by drills and excavators, and sealed with artificial stopping.

Preparation of Cavities.—Cavities in teeth are not always thoroughly prepared for receiving fillings. It is not enough to simply shape a cavity with a view of retaining the filling until the operation is completed, but every point liable to a renewed attack of decay must be guarded. All the softened fissures diverging from the cavities require cutting out effectually, and the margins, especially the cervical boundaries, need good sensible trimming. It is hardly necessary to state that every vestige of decay must be removed, but in doing so great care should be exercised to avoid invading the pulp chamber. Where the pulp is nearly exposed, being protected only by a thin layer of cartilaginous or decalcified dentine, better suffer it to remain so protected. Washed thoroughly with injections of warm water, and treated to creasote or carbolic acid, then nicely capped and filled, the chances of success will prove greater than where the pulp is uncovered.

For retaining fillings in superficial cavities, a very neat method has of late met with much favor. It consists of

small gold screws inserted into the substance of the dentine, giving a firm anchorage for the foil. These screws, with suitable drills, taps, and wrenches, have been extensively introduced to the profession by Doctor C. H. Mack, and are very favorably regarded by this committee.

The importance of keeping cavities dry when introducing fillings, is so universally acknowledged at present as to hardly require a word here. Your committee would simply remark that any dentist who has not used "*Barnum's Rubber Dam,*" should at once acquaint himself with its merits.

As to materials for filling teeth—what an array are presented! Gold in many forms; tinfoil, and a host of amalgams; plastic stoppings of gutta percha and zinc, *ad infinitum*—yet all are of value, each in its place.

For canal fillings and pulp cappings, Oxy. Chlor. of Zinc and gutta percha are much used, and. with pronounced success. The oxy. chlor. of zinc may be carried into the roots by means of a few fibres of cotton, wrapped upon broaches or root fillers.

For deciduous teeth, gutta percha stoppings answer an admirable purpose. It is quickly and easily manipulated, and clings to the walls of the cavities with a wonderful tenacity. About the only objection to its use is its liability to wear away when much exposed to attrition, and on this account tinfoil may answer a better purpose for grinding surfaces. This is also a suitable material for third molars, especially where the teeth are of low-toned caste. As to zinc fillings, "Guillois' cement" and "cement plombe" become quite hard if allowed sufficient time to set, and for pulp fillings, Dr. J. H. Smith's preparation has certain advantages.

In the restoration of defective teeth, our main reliance is still in the use of gold. It is presented in various forms—foils, thick and thin, cohesive and non-cohesive; cakes, crystals, and ribbons, Our goldbeaters are laboring hard to outdo

each other, and this wholesale rivalry brings out splendid material. We have gold to suit all operators and to humor all their notions. Among the forms may be noticed, "soft corrugated foil," "pellets" and "cylinders," conveniently prepared, also layers of "cohesive foil" cut in cakes.

A year or two ago, heavy gold was strongly advocated. Ribbons from No. 60 to 480 were considerably used. At present its use seems confined to a few operators, and but little is manufactured. On the other hand, light numbers of non-cohesive foil are probably used more now than ever before. Many of the profession, in their eagerness to secure cohesiveness in the property of the metal, have given too little attention to its *adaptability* to the tooth structure. This is a matter of vital importance, for unless the gold is well compacted against the walls of cavities, the fillings will prove leaky. Your committee are of the opinion that light numbers of non-cohesive foil can be more securely packed against the walls of the teeth than any other preparation of gold. Repeated experiments have shown that more of it can be consolidated in the same space than heavy gold or cohesive gold in any thickness; and this fact is worth considering, yet there is no question as to the superiority of cohesive gold for surfaces or contour fillings, or binding together the different portions of compound fillings.

All fillings need proper finishing. They should be smooth and bright. Since much of the finishing can be done by machinery, there is little excuse for neglecting such work.

Engines of various devices, neatly and ingeniously constructed, with instruments adapted to many uses, are in reach of every operator.

With the many advantages favoring dentists, operators upon the teeth at present day should reach pretty near the mark of *perfection.*

SUPPLEMENTAL REPORT

ON

OPERATIVE DENTISTRY.

USE AND VALUE OF MOUTH MIRRORS, AND POSITION IN OPERATING.

BY L. D. SHEPARD.

The student of dental literature will find but little in the text books and periodicals upon the subject of mouth mirrors. They are referred to casually as of advantage, but have not been given that important place in our cabinets that in my opinion they deserve.

In the examination of the mouth for the detection of disease, and to determine what progress has been made in the preparation of the cavity, its final shape, and an occasional use during the following processes, till the last examination, when the operation is pronounced complete, is about all that has generally been claimed for the the mirror. In a word, it has generally been regarded as of great value as an ADJUNCT to our case of instruments, for occasional use, (but not, as I regard it, a necessity for constant use,) or in other words, as an assistant to the eye in determining what has been done rather than as a constant assistant in the doing.

In discussing the use and value of mouth mirrors, as in the discussion of all of the operative departments of our practice, in distinction from the theoretical, it becomes necessary to adopt the first person if we would be explicit

and readily understood, hence, I shall be under the necessity of frequently speaking of how I use it in my daily practice. In thus speaking, I shall not claim any special distinction — only that I have mastered the use of this instrument, and hope that my words will encourage those who have not, to do so as soon as possible.

For some years I have been advocating a larger use of the mirror, and have observed carefully the practice of others—excellent operators too—and as a result of my observations and inquiries, am convinced that the large proportion of practitioners are sadly at fault in this particular, and as a consequence, do poorer work, with less facility and greater fatigue to themselves and patients, than would be the case were they to use the mirror more, and become, what any man can, master of it. What is necessary to constitute one a master of this instrument will be better understood further on.

The past few years have witnessed a great improvement in mirrors for our use, as in everything else in our specialty. The old ones were clumsy enough, and some of them expensive, of poor glass, and poorer frames, and totally unfit for comfortable use. The credit for the first really valuable improvement belongs to Codman & Shurtleff, Manufacturers, of Boston. They adapted to our use the light and handy mirrors which they had made for use with the Laryngoscope. The glass is round, and tightly enclosed in a thin metallic frame, the rim not coming to the surface of the glass—a great advantage—and with light but strong handles. They are made of three sizes, of which the middle one is most serviceable. No mirror equalling them had ever before been made. A joint in the handle is of no use, but a positive disadvantage, especially as it seems impossible to make them so as to remain fixed in any required position. If any improvement is desired, it is in the glass, although that has been improved of late. As I use them, the backing lasts longer than the face of the mirror, the latter getting

scratched with burrs and other instruments. They can be warmed so that the breath will not condense upon the glass. Another great advantage is their great cheapness, so that we can have a number on hand, and the glass is replaced at trifling cost. I much prefer those with ivory handles.

I do not approve of magnifying glasses, except for critical examinations. It is well to have one for this purpose, and then it should be of considerable power. I am convinced that long use of such, in my way of using them, is injurious to the eye. I used one of slight power for a year, and became convinced of its injurious effect. The focus is of a certain length, and of small extent, which adds to the difficulty of keeping the glass in proper position. With a plain glass, this is an easy matter. Another objection is the frequent change necessary in looking one moment through the magnifier, and the next without it. The eye adapts itself with wonderful ease and rapidity to varying circumstances, and suffers no injury unless overworked. The drafts upon our eyes under the best circumstances are very severe, and should not be needlessly increased. Hence, I prefer a plain glass for ordinary use, and a magnifier for special examination.

In considering the use of the mirror, I claim that a thorough master of it knows no difference whether he is looking directly at the tooth while at work upon it, or looking at its reflection in the mirror. By "no difference" I mean that he does not make any false motions. It is not necessary to remark that with the mirror, all motions are made reversed. A point can be reached where no special thought is required in regard to the direction of the motion, but the motion is made, as it were automatically. No man gives special thought to the direction of his movements when tying his cravat or parting his hair. Such processes have been performed so many times, that he does them automatically. In other words, he is complete

master of the mirror in toilet operations. A further illustration is found in becoming accustomed to the use of the duplex mirror, or hand mirror, in addition to the stationary one, as in parting the back hair. At first it is awkward, and requires special thought, but soon we master the situation, and have no difficulty. This is what I claim is requisite in one who has acquired full mastery of the mouth mirror. It is not simply that he is able to work while looking at the object in the mirror, but that he shall know no difference in ease and facility, and never make a false move. It is not only a possible consummation, but of less difficulty than one imagines who has never perseveringly attempted its acquirement. It cannot be acquired immediately, but by gradual progress—six months of faithful attempt will do much.

There are two classes of operations where this facility in using the mirror is of value. The first, where it is indispensible, if we would do good work; and the second, where although not indispensible, it is of incalculable advantage to both dentist and patient.

How men who cannot thus use the mirror manage to fill properly some cavities, I do not understand. To illustrate: Cases are not infrequent where cavities, and small ones, situated upon the distal surfaces of molars and bicuspids, not only cannot be seen themselves, but by the peculiar inclination of the teeth, it is impossible to see where they are without the glass. I will not imagine how such cases are met, but make the assertion that a man who cannot thus use the mirror, cannot fill them thoroughly and in the best manner. It is as impossible as it is to deviate the mallet force from a straight line, or shoot round a corner. Intelligent men claim that they can carry the gold by mallet force towards every wall of any kind of cavity—a false claim, and a most dangerous doctrine to teach. So I suppose the claim can be made that such out of sight cases can be got at and properly treated without being

able to thus work with ease, while looking at the tooth in the mirror. The wholesale cutting away of valuable and sound tooth structure in order to *see* the cavity, is as much the mark of a neophite or bungler, as is the same sacrifice in order to make a straight avenue for the mallet. Either practice is unpardonable in a man of *skill.* I have a thousand fold more confidence in the man who never uses the mallet, but is thoroughly old school, than in him who says he can get along without hand pressure, and drive home the gold in every part of the cavity with the mallet. I do not think it necessary to further urge the statement that there are cavities where the mirror is indispensible.

It is, however, in that large class of operations in which it is customary to get along without the constant use of this instrument, that I would particularly urge a change. There is hardly a limit to the circumstances and conditions in which there is great gain to both patient and operator in this ability to use the mirror. In probing the mouth or that critical examination which can only be made by drying the spaces between the teeth, and passing various instruments between, the mirror can be used to hold back the corners of the mouth and keep the napkin in place, while we are looking into it to see the direction of the various instruments and ascertain the condition of the teeth. In fact, this use of it as an extension finger is of great advantage in all processes—it may be a cheek holder, a tongue holder, a napkin holder, according to circumstances. Then in excavating, with the aid of the air syringe, we are enabled to see, at all times, just what we are doing and never obliged to operate simply by the sense of feeling. Some may be able to determine fully by this one sense alone, but when we can, is it not better to call in the additional sense of sight? Particularly is this the case when cutting about those portions of the tooth which are nearest the vital centre, which are at the same time deepest and most inaccessible to unaided sight. To express it otherwise,

we, in effect, put our eyes where the glass is, or can look into the cavity as if we got bodily into the very mouth itself. This greatly facilitates the operation, as well as insures greater safety and thoroughness. In putting in the filling, the same argument applies, with the additional advantage of being certain that there are no spaces left unfilled, which the next piece of gold will cover up, unless we take time to examine with the glass very frequently. With the glass in position much time is saved.

There is a certain class of cavities where the glass enables us to adopt an improved method of operating. As an example, in proximal cavities in the superior incisors, when the palatal wall is thin, we can cut out this thin wall and gain access from behind. Through this opening we can see all parts of the cavity, save all or nearly all separating of the teeth, excavate with greater certainty, fill more thoroughly and avoid all showing of the gold. This method of gaining access to the cavity, with more or less bevelling, after the manner advocated by Dr. Robert Arthur for the prevention of caries, has been practised by some of our most eminent operators for fifty years. Among the most prominent living exemplars of the advantages of this method is Dr. Edward Maynard, formerly of Washington, who always operated in this way, and worked from underneath, using the mirror. I became convinced of the merits of this method, some years since, by seeing many teeth which had been so filled by Dr. Riggs of Hartford. He called the separations made by the cutting away of the palato-proximal angles "self-cleansing spaces." It may be possible to operate in this manner by tipping the patient's head very far back, but the only proper way is to use the mirror for our guidance. I believe that in certain classes of teeth this method is the best which can be adopted. The great reason why so few have practised it in the past, has been the difficulty of seeing the cavity which, by the use of the glass, is removed.

But perhaps the greatest argument for us, is the relief which the glass gives from a constrained and health-destroying position of the head and body while operating. The head is erect and above the patient, instead of being bent down so as to look up into the mouth. The patient is also relieved from the severe strain upon the neck from tipping the head back so far, as well as the necessity of so wide an opening of the mouth. It is well known that dentists, as a class, break down early in their practice if kept very busy at the chair. Where there is a miscellaneous practice, which includes extracting and plate work as well as filling, the change from one to the other, gives relief and rest; but to the branch which is entirely occupied, hour after hour, in filling teeth, the strain is terrible. Very much of this is the result of standing in such an unnatural position.

Coupled with this method of practice is another of scarcely less value to the health of the operator, of which I can speak with great assurance from many years experience. As we look around upon a gathering of dentists of a size like this, perhaps the most noticeable feature is the small percentage of men of age. If this is so with this body, which is to a large extent composed of men of comparatively large experience and long practice in the profession, would it not be likely to be still truer of the mass of practitioners throughout the country? That it is so, no one who has had much experience in meeting the profession can deny. To a certain extent, this is the result of the great growth in numbers of the profession within the past ten or fifteen years. But this explanation cannot answer the question, "The fathers, where are they?" There were men enough in the profession years ago to give us many fathers to-day. But we look almost in vain for them. Why do we miss Varney—the finished and accomplished—and scores of others, older or younger, whose names will occur to you as I read, who are either dead or practically

so, as far as further usefulness in the profession goes? The answer is plain. The practice of our profession is exhaustive to both mind and body. The mind, though, seldom fails except as the result of abuse, but the body does from a too great and long continued drain upon the vital functions. It is of great importance to us to discover methods of operating by which this drain will be lessened without detracting from the thoroughness of our operations. I have secured this result by sitting while operating, and would urge it upon the profession as worthy of a fair trial. Eight years ago I felt myself breaking down from severe labor at the chair, and was obliged to give up practice for a time. I then commenced to sit while operating, and have done so ever since. I know that it has saved me from the necessity of quitting practice, and that I have operated during these years with equal facility and far less fatigue than before. There may be others in the profession who have been in the habit of always sitting while operating, but I have heard many say that they had tried it and given it up. I think the cause of their want of success was because they had not the right style of stool. What is needed is a firm support to the spinal column, and this should be as nearly as possible like what we get when seated in a chair with the feet resting upon the floor at a little distance from the chair. In sitting upon a high stool we do not get this support by resting the feet upon the rounds of the stool, for our point of support is then too near the base. To arrange the proper support, take an ordinary four-legged, high, office stool, cut the legs so as to make it the proper height, affix to two opposite rounds, or otherwise, a board extending twelve inches beyond the legs, then place another board of similar length above this, crossing it at a right angle. We now have two foot-rests extending twelve inches from the adjacent sides of the stool. Place this stool so that one foot-rest will be behind the operating chair, and the other on the side. When seated upon it, one leg will be behind the

chair and the other on the side. We are thus near the chair, and firmly braced. We can then exert as great force as when standing, and have the same command of the arms, the spinal column is firmly supported, and we have an entire freedom from that sense of exhaustion and pain about the loins, which results from an undue curvature of the spine in the small of the back, from standing a long time with one arm raised and around the patient's head. Those who have not tried this method can have no conception of the relief from pain and fatigue which it brings, and of the hours of extra work which they can safely perform by the aid of this simple contrivance. I should add, however, that my experience with it is in conjunction with the mirror, and that, perhaps, without the mirror its most beneficent effects may not be realized.

I commend to you a patient and persevering trial of both these adjuncts to health and happiness in practice, with the assurance that, were I to be deprived of either of them, I should not wish to continue in the practice of dentistry.

SUPPLEMENTARY REPORT

ON

OPERATIVE DENTISTRY.

BY E. A. BOGUE.

At the request of the chairman of the committee, I will, if the Association desire it, read a few extracts from some foreign journals, not easily obtainable here, on the subject of amalgams, connecting them a little by verbal statements.

I found myself needing a plastic filling that was more reliable than any of the ordinary amalgams sold in the shops, and a very little personal examination showed my own profound ignorance upon the subject, and the fear lest some others may be in the same condition shall be my excuse for this novel report, which is so far from being original.

Amalgam is the term applied to all compounds of mercury with other metals, and, in speaking of it, we do not at all discriminate between the different varieties; it is either wholly condemned without regard to its constituents, or it is perhaps sparingly used with a mental protest, as being in some cases desirable, but without any knowledge of the real properties of the compounds in use, and generally without a knowledge of their component parts.

Let it be noticed in the papers that I shall now proceed to cull from, that the shrinkage of different amalgams varies, by the specific gravity test, from 37-1000 to 38-100—the latter shrinking ten times as much as the former. Mr. C. S. Tomes, in a paper read before the Odontological Society

of Great Britain, calls attention to the failure of amalgam plugs, in the crowns of molar teeth; for example, where a good filling would probably have succeeded, and notices that when such amalgam plugs are removed, the whole bed in which they have rested is found soft and discolored, a condition of things never found under good gold or tin fillings, where some portions are always protected from decay, even if other points fail.

The inference from this is, that the amalgam has never, at any time, formed a perfect plug; that is to say, never been in perfect contact with the walls of the cavity all round its circumference. He goes on to say—Believing, then, that chemical action on the amalgam would not account for the very general failure of such fillings, especially as those which are most successful—namely, copper and palladium amalgams — are those which become most completely blackened on their surface, I went on to experiment on the probability of getting perfect adaptation to the walls of the cavity in an amalgam filling.

In the discussion on the late Mr. Laurie's paper on "Plastic Fillings," may be found a statement that some amalgams expand in hardening, and may, even in this way, split off portions of enamel; whilst in Mr. Fletcher's paper, it is stated that the addition of platinum to the ordinary silver and tin amalgams, prevents shrinkage as they set.

Mr. Coleman, commenting on the paper from which I am reading, says that, after having filled a number of teeth with amalgam out of the mouth, examination a few days afterward with a magnifier, showed distinctly, in some cases, that the amalgams were no longer in contact with the walls of the cavities, and that, moreover, they projected from the cavities. He consequently came to the conclusion that some amalgams, in hardening, have a tendency to assume a spheroidal form.

Mr. Kirby described an apparatus, which would measure the contraction or expansion of a bar of amalgam or other

metal, to 1-10,000 of the diameter of the mass. It appears that, as has been stated, many of the amalgams in use contract during setting, and further, that change in form as well as bulk takes place in all, when they are used in the hard state that has been recommended. These changes often continue for days, or even weeks.

Amalgam of pure silver, either in the form of a precipitate or of filings, expands greatly; the former to the extent of 1-40 diameter or more.

Silver filings, after being made into an amalgam and allowed to set, change their surface from a smooth to a modulated one, from gradual absorption of the mercury by the granules of uncombined silver.

Mixtures of silver and tin, with more than one equivalent of the latter, contract to a great extent, the contraction lessening as the silver is increased, until, with three equivalents of silver to two of tin, an amalgam is formed with one equivalent of mercury, which, after some contraction, finally expands about 1-500. A mixture of two equivalents silver, one tin, and about 25 per cent gold, expands without any contraction.

Amalgams rich in silver, set very rapidly, but appear to give the best results when the metals are in equivalent proportions. The quantity of mercury also greatly influences the expansion, but has another and even more important effect, for a plug made of hard amalgam changes its shape greatly, continuing to do so for some days; some bars so made could not be measured again in the course of a few hours from this cause.

In the silver and tin amalgam. the equivalent of mercury is nearly twice the weight of the mixed metals; and if the last portions of the filling be squeezed dry, and the surface of the amalgam be further freed from mercury, by applying to it a lump of very dry paste, the last part of the filling so made will expand more than the first, by abstracting mercury from it.

Now to return to the paper of Tomes'—he says: I took portions of Sullivan's, Ash's and Rutherford's amalgams, and mixed them up as thickly as they could conveniently be used; in every one of these, contractions, as indicated by an increase in weight, when they were weighed in water, took place during their hardening; in one instance, as much as 1-45th of the whole bulk of the mass. Seeing such a contraction as this must leave a minute fissure all around the plug, the next experiments were directed to determining the period at which this contraction took place. The result was, that contraction was shown to be at first rather rapid, but that it continues for many hours. The comparison of the weight gained by different amalgams, during the specific gravity observations, was as follows:

Palladium, - - - - - -	.037
Sullivan's Amalgam, - - - -	.07
Ash's - - - - - - -	.14
Smale's - - - - - - -	.14
Tin and Silver, (55 to 45), - -	.35
Tin and Silver, *aa*, - - - -	.38

In this table it will be noticed that palladium enjoys a marked pre-eminence; its contraction not being more than half that of Sullivan's, which, from this point of view, is next best, while the amalgams composed solely of tin and silver, of which a great number are sold, differing very little from one another, show a much greater amount of shrinkage.

The addition of gold has a power to hinder contraction, but there is a practical limit to its use; as, after the gold reached the proportion of four parts in ten, the amalgam did not harden well.

Moreover, these amalgams (containing gold, silver and tin,) kept a beautifully bright surface, retaining very minute impressions, so that within moderate limits, the addition of gold effects a very definite improvement, but it is possible that the diminution in shrinkage may be simply due to the amalgam hardening less perfectly.

Mr. Fletcher says, that out of more than 200 different alloys tested, about twenty were set aside for further and more critical testing, and most of these have been examined without any specially good results. Speaking of the power of gold to prevent shrinkage generally, he notices one amalgam on which gold has no power to prevent contraction, though it lengthens the time required to harden: one part platinum, thirteen parts tin, and twenty-six parts silver, make an intensely hard alloy, which, when reduced to filings, will combine with a rather large proportion of mercury, and set very hard in four or five minutes; yet it is useless for fillings, as the shrinkage is great, and continues, even after it is perfectly hard—a very unusual property—the shrinkage almost always ceasing when the hardening is complete.

Mr. Fletcher further says, that the result of about four years' steady experimenting, in search of a perfect plastic filling, is both small and unsatisfactory.

Of the class known as osteo-plastic, not one appears to be trustworthy in the majority of cases; the best being quite similar to Guillois' cement, but will stand a more severe test and is more permanent in the mouth. The composition is: Powder.—Three parts oxide of zinc (*Vielle Montague*), one part glass, ground to an impalpable powder. Liquid—Take fifty parts neutral solution of chloride of zinc, of the strength of 100° Twaddell's hydrometer, and add it to one part borax. To make this cement trustworthy, the oxide of zinc must be made red hot before mixing with the ground glass, and it must be used within a few days after it has been heated. If the oxide of zinc has been heated to clear redness just before using, the cement will resist acids.

When a proportion of ten per cent. of fine gold is added to the ordinary silver and tin amalgam, with sufficient platinum to cause rapid setting, an amalgam is obtained which has many valuable properties, becoming hard in ten or fifteen minutes, and taking in that time a brilliant polish. This is the so-called platinum amalgam, which I have used for a

long time with particularly good results. All who have worked amalgams, know that if the slightest excess of mercury is added, it works to the surface during condensation, and that the alloy is, therefore, unequal, and the quantity of mercury on the surface is often very large. On hardening, this portion of the filling contracts as the excess of mercury is taken up; and the advantage of a rapid-setting amalgam is, that this contraction may be compensated for by further condensation when nearly hard. Gold has the property of making amalgams more plastic, and, therefore, ensuring a better fit to the walls of the cavity, * * but a large proportion of gold is no practical advantage; as by lengthening the time required to set, it prevents the power of after condensation, which I believe is the cause of the practical success of this platinum alloy in the mouth.

Apologizing for such a bit of extracts as this, I yet may venture to hope that some further investigations may be provoked, and that we may reach a better position as a profession on this question than we now occupy, at least, that we shall know the properties and composition of our fillings at least as well as the general practitioner knows those of his prescriptions; and I here and now enter a protest against the use, by our profession, of any remedies of whose composition we are in ignorance, let those remedies be patent medicines or amalgam fillings.

DISCUSSIONS.

OPERATIVE DENTISTRY.

After the reading of the reports upon Operative Dentistry, the President announced the subject open for discussion.

Dr. Forbes—I would like to ask the gentleman who read the last paper, how he would operate in the manner indicated, the patient being a laage fleshy woman and the cavity v-shaped in a central incisor. Dr. Morgan being, physically speaking, the best representative of the case in question, was called for, and Dr. Shepard proceeded to demonstrate upon him his manner of operating.

Dr. S. H. Noble—I wish to endorse all that Dr. Shepard has said upon the subject of mirrors. It has been very much neglected. This was one of the first things brought to my notice by Dr. Maynard. He would accustom his students to the use of the glass. It would greatly save our backs if we would learn to use them properly. When we can use them with facility, they can be employed with great advantage, not only in excavating, but also in plugging.

Dr. Abbott—In one of the reports of the committee, the subject of children's teeth was touched upon. I have given this matter a great deal of attention, and am satisfied of the necessity of preserving the first or deciduous teeth. We can instruct the people upon this point. As an illustration: I have two little ones, five and seven years of age respectively, who brush their teeth as regularly as I do my own; and whenever there is the least manifestation of decay, they

are anxious, yes, even coax, to have them filled. I commenced filling for my little daughter at the age of two and a-half years, and have made some sixteen fillings for her, some upon grinding and some upon proximal surfaces. The materials I use are gutta percha and amalgams, the former for proximal and the latter for grinding surfaces. Tin is an excellent material, but I am unable to condense it sufficiently to stand the wear of mastication. In the teeth of children it will wear out in three months. I know very well that to advocate the use of amalgam for the preservation of teeth, is setting one's self up as a target to be shot at by many men in our specialty, but, notwithstanding this, I use it, and advocate its use, because I consider it the best material known, where necessity compels us to use light force and a very short time in condensing. I fill the first or six-year molars with this material, when a child is six or seven years of age; and as soon as they are old enough to undergo operations with gold, I remove this and put the gold in. I seldom find the teeth decayed around these fillings, after being in from three to eight years. I have tried all available materials for children's teeth, but have never yet—taking all things into consideration—found any material that would do as well, where a hard filling is required, as amalgam. I would like to have any one, if they can, suggest something better, or as good, even.

The subject of capping pulps is one of great interest to us all. My mode of operating, I presume, is similar to that of others, or so nearly so that it would be time thrown away for you to listen to it. There are some few points, however, in connection with the operation, which may be of interest. If a patient comes to me with the pulp of a tooth exposed, and suffering pain from such exposure, I cleanse the cavity as thoroughly as convenient, without irritating the pulp, then apply a pellet of cotton, saturated with creasote. (I still use this instead of carbolic acid or thymol.) Then seal the cavity perfectly. This is best done with a mixture of

equal parts of pink gutta percha and beeswax. This mixture possesses the property of becoming very soft indeed when held over a spirit lamp, and still retaining its position on the instrument with which you are using it, also of being packed into a cavity in a tooth where the pulp is exposed, and perfectly sealing it without producing pain. In some cases pulps so treated will die, others will live, and you may, at the patient's next appointment, cap as usual. In applying the oxy-chloride of zinc, I use either a ball burnisher or a bit of cotton wound upon a nerve instrument, adapted to the size of the orifice of the cavity, so that when carrying it in, it will touch nowhere until the bottom of the cavity is reached. In using it in this manner I very seldom have a surplus to cut away. When I have sufficient over the pulp, I use the gutta percha and wax to seal the orifice of the cavity with, and let it rest until I wish to operate further; sometimes I fill with gold, or any material I wish, immediately, and sometimes I wait a day or two. I usually have one failure in seventeen in such cases.

DR. DICKERMAN—What do you mean by failures?

DR. ABBOTT.—When the pulp dies. I had one case of a lady for whom I capped the pulps in three upper bicuspid teeth, and filled them with amalgam. Some two years after she got married, and thereby became financially improved. About three years from the time I operated for her first, she came back to have the amalgam fillings taken out, and gold put in instead. On removing the amalgam, the cap was removed also, and, to my delight, I found a deposit of dentine at the former point of exposure of the pulp, sufficiently thick and strong to withstand the pressure necessary to use in condensing the gold, without recapping. In the minute opening where the pulps were formerly exposed, a bit of oxy-chloride remained, when the cap came away. I consider Dr. Smith's preparation of oxy-chloride the best I have ever used. As regards the rubber dam, I never put it

on a tooth until I am ready for filling. The mouth mirror is certainly an excellent auxiliary in our operations, but it will require so much time and practice to get at all proficient in its use, as recommended by Dr. Shepard, that I hardly think it will be generally adopted. I have no doubt but that the Dr.'s mirror is a good one. I object, however, to his mode of filling front teeth; from my own experience and my observations of the operations of others, I don't believe there is one dentist in ten who can fill those teeth *perfectly*, in the manner recommended and described by the Dr. I can hardly conceive it possible to carry gold behind the front teeth, and pack it into proximal cavities sufficiently perfect to preserve them. In the great majority of plugs made in this manner, the teeth on the labial surfaces soon become discolored, showing very conclusively that the gold is not adapted to that portion of the walls of the cavity. I prefer always to have the cavity so shaped that I can see every portion of it directly, or as nearly so as possible, in this location. In other words, I cut away the labial wall of the cavity so as to enable me to fill from the front—always taking care that there is no undercut in the labial portion of the cavity. In this manner, I can get at *every* part of the cavity directly, and condense my gold as certainly and perfectly, and I might add, as conveniently as in an ordinary crown cavity in a molar.

Dr. Crouse—As to the matter of filling front teeth, I should not have supposed that the gentleman would have said what he did had he not previously stated that he filled children's teeth with amalgam. I should consider a man crazy who would cut away the tooth substance just to save work. As to the use of the mirror, though I don't pretend to operate in the manner suggested by Dr. Shepard, I resort to it in dark days, when I can't see without the reflected light. The gentleman last upon the floor says he never applies the dam until the cavity is ready for filling. Then, four times out of five his cavities are not ready, and if he'll

use his mirror after the dam is adjusted, he'll find that they are not.

As to tin-foil, I consider it ranks next to gold. I have known it when put in properly, to last fourteen or fifteen years in cavities, on the grinding surfaces of the molars. I am sorry to hear any gentleman in this Association advocating the use of amalgam. I protest against it, if they would just quit being lazy, there would be no trouble. I have taken the same class of patients as those referred to, put the dam on, and filled successfully with gold. If I had a child, and a dentist were to fill its teeth with amalgam, I would prosecute him for mal-practice. Teeth are injured by amalgam, and I know of no excuse for using it except laziness. I can put a gold filling in the mouth of the most nervous child.

DR. ABBOTT—As to the use of the dam, most of us here have filled without it, for from ten to twenty-five years, and those fillings are as perfect as those made now. Were not those cavities well prepared? In advocating the use of amalgam, I have done it honestly, and if men would use the material properly, it would take much blame off of the material. It is not the material. Many patients come in to us who are in a hurry and who cannot wait for gold fillings, others who cannot pay for them, and there is no remedy for it. But there is no mistake about it, amalgam will preserve the teeth. I agree with Dr. Crouse, that tin is next to gold, I am not sure but that it is better for teeth of young children. But I was speaking of those cases where it is impossible to put in a gold filling. In these cases, I take a small cavity, fill it with amalgam, and save the teeth. I am, however, bringing forward nothing new, for this is the teaching of all the schools.

DR. WEATHERBEE—The duty of every practitioner is to subserve the very best interests of the patient. Now I cannot conceive how we can do better when we find a small

cavity, which scarcely shows, not being seen from the palatal or lingual surface, than first to apply the dam, then wedge it open sufficiently to pass the finest instrument. Now, am I to enter from the labial side? No. I would pass in a burr, cut away the enamel from the under side, and then proceed to excavate. A retaining pit is made, and I commence my filling, the gold being kept in advance. The fullness extends to the other tooth. I take a file and cut off a large portion. The filling is then burnished. As to the gold showing, I hold that where the cavity is large, and the enamel frail, we should cut away until we come to a solid part. Instead of cutting in a slanting direction, maintain the integrity of the tooth. It is better that the gold should show than that the tooth should be injured. It may be said that you cannot get at it. Away with this! You are supposed to be acquainted with instruments that will reach even where the eye cannot see. If a man is faithful, he will have no difficulty. It can, it should be done, our self-respect demands it.

Dr. Butler—In regard to children's teeth, I wish to give my endorsement to the use of tin. Take, for example, the six-year molars. What are they? A crown, but not a solid root, and the amount of force necessary for packing gold is more than the tooth ought to be subjected to. The structure of the tooth is such that you may cut down into the sulci, and you are also liable to powder the edge, and in nineteen cases out of twenty you have not preserved the tooth. When you cut the cavity out, you want the tin introduced as quickly as possible. Put it in rapidly and tight, and there will be less strain than in packing gold. In many cases it is difficult to decide when you have got a good strong margin, and it will not do to pack gold without it. The operator ought to be the judge as to the best material to use. But the patient may say—"I like gold better." I answer, so do I; but it is better to have a filling that will remain nine years than one that will remain only six. We

can educate the patients, and there is no better way of getting hold upon the people than by managing the children. I use tin in filling temporary teeth, but I don't go in so much for filling teeth as some do. I would rather, in most cases, simply cut away the decay and cleanse them thoroughly. I do not think amalgam does as much harm as some seem to think. I am surprised that some gentlemen do not use the dam for preparing their cavities. I always apply it, for two reasons—I get my patient under my control, and I can operate so much more rapidly with it. I can get my wedges in much better. To some, the application is very disagreeable, and I would enjoin you to be humane. Don't get your patients irritated. I claim that it can be done if you take proper pains.

DR. MOORE—No one method of operating is adapted to all operations, and I do not rise to advocate any one method. I only wish to call attention to some of the dangers incident to regulating teeth. I do this as a warning rather than anything else. I exhibit here a tooth, wrung from the head of a patient—a child thirteen years of age. The operation was commenced with rubber bands, which were worn two or three days. The teeth becoming very sensitive, the bands were removed, and inflammation set in, which continued for six weeks, one tooth becoming more and more sensitive, and pus exuded from around it constantly. Two months afterwards the patient came to me with the tooth very much elongated. I cut the integument, and found that a rubber band had been left around the tooth, which had worked up out of sight and destroyed the pericementum. I sent the child away, and two weeks afterwards it returned, with the tooth so pushed out that it had to be taken out. I detected the presence of the rubber band by the smell.

THIRD DAY—EVENING SESSION

DR. ATKINSON—Here, as everywhere, we are more in-

volved in words than in ideas. Each individual has a method of which he becomes the earnest advocate. The manner of using agents has more to do with the success of the operation than the materials used. The degree of thoroughness will be equal to the care with which an operation is performed. One man says, that under certain conditions, a cavity may be filled with certain materials, which cannot be used under other conditions. In some cases the tooth roots are said to be unable to bear the packing of gold. I have never known a tooth erupted, which could not be packed with gold. Gold can be impacted with as little pressure as tin. I have taken 120 foil, and laid it in a cavity, layer after layer, with the infant lying in my lap. Now we are all a unit as to our aim, and the only difference between us is, that every man would have every other man believe that *he* is the best dentist in the profession. We come here to get at something that we can carry away with us. Nine out of ten is a very modest proportion of the profession who cannot do anything unless you show them how to do it. You might preach to them forever and they will not learn, because they do it mechanically and by imitation only. One-tenth of the profession, perhaps, will be taught through their brains. A question in operative dentistry has been sprung, which we now proceed to consider. It is said the susceptibility of dentine is due to the continuation of the cornua. In the quadricuspids, if one of the cornua is cut off, one-fourth of the sensitiveness is destroyed. In other words, to cut off the cornua is to anæsthetize the tooth, the extent of the anæsthetization depending on the number cut off, and in exact proportion. Now in regard to all this, I reckon it would not be best for me to say the man is a fool, so I will just simply pass on.

All actions of the body are *par excellence* chemical actions. All chemical action is surface action. This is demonstrated in the solution of rock candy, which dissolves surface after surface, until all is gone. It goes just like fire.

This is something lower than crystallosophy—it is cellosophy. Now if we understood properly the principles of cellosophy, we would cut all the territory that is sick, whether the child is one year old or ten. Any indestructible agent will save the tooth. I have put in a filling of tin upon the grinding surface, which has remained for twenty-two years, and is still there. The name of the patient is Wm. Higley. But you had better be careful how you advocate any special material. The nearer we come to obeying the law of the organism the nearer do we come to correct treatment. Something has been said about pushing gold to the labial or lingual surface. That is all bosh. Apply it in the line of the axis of the tooth, and you are sure to apply it in the most direct way. If you get C. H. Mack's retaining screws, and use them properly, you can fill any cavity.

Dr. S. B. Palmer called attention to his mode of fixing an adjustable handle to the mouth mirror. It consisted in attaching the mirror to a neat copper wire which could be bent in any direction.

Prof. Judd—There are several pathological conditions to which I would like to call attention. One of these is the *green stain.* I have been very much annoyed by this, both on teeth of children and adults. It commences near the neck, and sometimes extends over the whole enamel. In one case of a child twelve years old, the teeth were completely covered by it, and it returned in a short time after removal. In the Philosophical Transactions, I had seen it stated by Schrœder, that the microscope showed this to be of vegetable growth. The name of *protococcus dentalis* has been given to it. The treatment for its relief consisted in the application of the following remedy, viz.: One drachm of carbolic acid and one ounce of glycerine, applied on a stick every two or three days, under which treatment it gradually disappears. Others have used this with the same success. It has also been successfully used for sensitive gums.

DR. THOMAS—In reference to wedging, I would say that for a long time I always resorted to slow wedging. I have learned, however, that quick wedging is much preferable, and I think that slow wedging must be among the things of the past. (Cries of No, no.)

In regard to the use of the dam, I was surprised to hear some gentleman say that he did not use it in preparing cavities. I find it just as useful when adjusted before preparing the cavity as when I proceed to fill. I have found that if the tooth is kept from moisture while preparing the cavity, there is a great lessening of the pain. The first touches are generally exceedingly sensitive, but if the cavity is kept free from moisture, the sensibility is diminished. The application of the dam before preparing the cavity will facilitate the operation very much.

Dr. Shepard's mode of operating I have found very effective. Take, for instance, the proximal surface of the central incisors; fill on the lingual side; bring the instrument to bear upon the gold at right angles. I prepare the cavity so as to get the pressure in the longitudinal line of my tooth. I do not believe in sacrificing good tooth substance, therefore I only resort to this method when I cannot do otherwise.

DR. SOUTHWORTH called attention to the dishonest practice of making fillings, and leaving one or more roots unfilled.

PROF. TRUMAN.—In reference to *green stains*, very many are at a loss to know what it is. It appears to be a vegetable growth, found where there is an extreme acid condition of the mouth. We do, not only, find these on the labial but on the proximal surfaces also. These vegetable organisms cause caries. That they are vegetable may be demonstrated by placing them on a slide under the microscope, and then applying iodine, with which it strikes the characteristic blue indicating the presence of starch. These are undoubtedly produced by an acid condition of the oral secretions.

In regard to Dr. Abbott's method of filling, I can't see how he can fill as well on the labial side as in the axis of the tooth, and I don't believe in letting the gold show in the mouth. We must study æsthetics as well as utility.

There is one point in the report to which I would call attention. There is a growing tendency to soft fillings. I have advocated the adhesive mode of filling. I find, too, that those who advocate the use of soft gold make it adhesive by passing it through the alcohol flame. I saw it stated that more soft foil could be filled into a given space than adhesive foil. I have made extensive experiments with both, and pack the space with adhesive, so that it is entirely filled, and this is what you want. It cannot be more than filled. Another point in regard to tin—in many cases, it is the only filling that will do. I will not fill six-year molars with gold.

Dr. Abbott.—As regards the matter of direct pressure on the line of the tooth, I think—yes, I am very positive—that the pressure can be brought to bear more directly from the labial than from the palatal surfaces of incisor teeth, and a good operator can always be certain of a perfect operation. In relation to the adaptability of gold, I think I have proved very conclusively that with the same pressure exerted, and using the same points, more soft or non-adhesive gold foil can be packed into a given sized cavity than can be of any other preparation of gold known. In a cavity where I have packed seventeen and one quarter grains of soft foil, No. 4, I have not been able, in trying repeatedly, to pack over sixteen grains of any kind of adhesive gold, even as light as No. 2 foil. Adhesive gold, when being condensed, every particle, in coming in contact with another, adheres so tenaciously that before it is thoroughly condensed, it offers too much resistance for the strength of the tooth, and, if carried to perfect solidity, the pressure in nearly every case would be sufficient to break it.

One word in relation to the rubber dam. One gentleman

concludes from his observations, that in its use upon the tooth while excavating, the tooth is rendered less sensitive. If that be the case, it certainly is an excellent thing. Another has observed to me privately that, in his estimation, one of the greatest advantages in its use while excavating, is that it prevents the patient from talking, thus saving to the operator considerable time that otherwise would be lost. I have no doubt there is something in this with many dentists. I am not troubled with too much talking of patients, however.

I have been requested to give my mode of treating deciduous teeth where the pulps are exposed. It is as follows: I first cleanse the cavity as thoroughly as practicable, then apply to the pulp a pellet of cotton saturated with creasote, and then dipped in tannic acid. This has the effect to render the pulp insensible to pain or irritation, so that it may be removed. I then fill, taking care, however, that none of my filling goes into the pulp canals. This I accomplish by placing a piece of gutta percha or a pellet of cotton in the pulp chamber over the canals. In case the pulp is dead, and an abscess is found discharging, I cleanse with tepid water, then force through the pulp canals, abscess, and fistulous opening, a saturated solution of permanganate of potash; then I force through in the same manner carbolized oil, (one part carbolic acid and fifteen of olive oil.) The pellet of cotton, which I place over the canals in such cases, I saturate with the last-named solution.

Dr. Eames recommended the cutting off of the soft portions of six-year molars, as it was almost impossible to fill these chalky teeth. He had tried this simple plan, and found it good treatment.

Dr. Wetherbee—I would lay before the Association, as comprehensively as possible in the short space of time allowed, my method of *ingrafting artificial crowns on the roots of teeth*, a branch of operative dentistry too often neglected.

This method is applicable to the *incisors, cuspidati and bicuspidati.* It is the only method giving any assurance in operations on the roots of bicuspids.

I first take an impression in wax, from which I obtain a *fac simile* in plaster, of the tooth to be operated upon. Next the color of adjacent teeth is obtained. When the model is sufficiently hardened, I remove the crown, cutting my plaster root as nearly as possible, to the form requisite for future operations on the root which is to receive the crown. I then drill the plaster root, making a canal the size of the gold pivot to be used. I have now the distance between the centre of the root and its labial surface. A wax tooth is carved indicating the style desired. In thickness, it must correspond to the depth of the root between the canal in the root and its labial surface.

The tooth is made containing four pins set either side of the centre longitudinally, adding much to the strength of the tooth. I now make my gold pivot with exactness, in length and size. On the palatal surface of the pivot, one-eighth of an inch from the base of the crown, is to be soldered a small point of gold for future use. In the backing for this tooth, I have cut a hole at the angle of twenty degrees; I fit my gold plate as a base for the tooth, to which the pivot is soldered, and placed in position on my model. A gold backing is fitted to the crown, and placed in position on the cast, when the base containing the pivot and the crown are united by soldering.

Through the *base plate* which covers two-thirds of the root, a slot is filed in line with the pivot, until it shall reach its palatal surface. This is necessary, that I may have room to fill with gold against the point of gold on the pivot, for the positive retention of the tooth in its place.

I now proceed to the actual operation of which the former work has been preparatory. The patient being seated in the chair, I proceed, with a small drill, to insert two pins, one on the labial and one on the palatal surface of the root, one

line and a-half above the margin of the gums, for the purpose of pressing back the gum by the use of the rubber dam—which is requisite—keeping the parts free from moisture.

The dam is applied and firmly ligated above the gold pins. I then excise the portion of crown remaining, and file the surface of the root to the requisite depth. The *dental canal* is prepared and filled from the *opicial foramen* one-half, more or less, of its length. The remaining portion is to be occupied by the pivot, which is to be drilled a crowding size smaller than the pivot. One-eighth of an inch in depth is to be enlarged to allow being filled with gold around the pivot. The next step is to drill eight or ten retaining pits in the surface of the root. Two steel pivots are now inserted, one in the *dental canal*, the other, which is only one-half in size, next to the first on its palatal side. I then fill the enlarged cavity around these mandrills, also the retaining pits, and go on with my operation until the surface of the root is amply covered with gold.

I now remove the steel mandrills, and file my gold to a proper thickness and form for a positive adaptation to the new crown. The crown is now placed in position requiring some force to carry the pivot home. Then I fill the slot occupied by the second mandrill, but now occupied in part by the point of gold previously soldered to the pivot for a *catch*, this slot being filled through the slot cut in the base of the crown. The work is continued until I have restored the tooth to its normal size and form.

The hole in the backing is reached with the gold, and filled so as to make the palatal surface perfectly strong. By the union of the gold, within the root and on its surface, with that on the palatal surface necessary to restore its form, the work is made stronger than by any other known method.

It is then finished on the labial and palatal surfaces. On the palatal surface a line of gold, one-twentieth part of an inch in thickness between the crown and root, is seen, but is

usually covered by the gum, when it shall return to its normal condition. The two pins are cut off and filed even with the surface of the root, and the operation is completed.

By this method of inserting artificial crowns, I claim the preservation of the root for a very long period; also greater strength and corresponding comfort to the patient, which is of sufficient importance to claim your careful and practical consideration.

The subject was then passed, and the Association proceeded to select the next place of meeting.

REPORT
ON
DENTAL EDUCATION.

BY L. D. SHEPARD.

As my apppointment on the committee on Dental Education was made since this session commenced, to fill a vacancy, I cannot hope to more than briefly touch upon a few of the most important points connected with dental education.

I rejoice that great progress has been made, and is yearly making, in respect to professional training. Much of this is the result of our Associations and our literature. To these I give all honor and God-speed; but to my mind the great hope for the future elevation of the profession is to be found in our professional schools. To elevate their standard, increase their facilities for instruction, and enlarge their lists of students, should enlist the earnest sympathy and actual support of this Association, as well as of each individual member of the profession. To this department of dental education, I propose to confine myself in this report.

Before I enter fully into my subject, I desire to assure you that in what I shall say I intend to make no comparisons between schools, nor to reflect upon the foundation, methods of instruction, or rules of government of any of the Institutions with which I have not the honor to be connected. For what they have done for education, I give them my warmest praise. Wherein they have failed to come up to the highest requirements, having earnestly worked, is largely due to the times, the want of the facilities which I shall

advocate, the apathy of the profession, the competition for students to secure financial support, and the low standard which the profession has endorsed as a requisite for graduation.

To the men who have faithfully filled professorial chairs, giving freely of their time and energies—of no small value in money—I bow with respect, as the young in service should to veterans. I am happy, though, to claim the honor of a younger brothership in this noble family. I tell you, gentlemen, that with all their faults and shortcomings, they, and not the outside workers, deserve the credit for what progress in education has been made in this generation. The money value of the time and labor which they have freely given to the cause is greater than that given by all the rest of the profession together.

With such feelings, I proceed to the consideration of the changes which I consider of inestimable importance for the future.

I. Dental colleges should be endowed.

No good school can be carried on without it. What is our system of free common schools but one richly endowed by the commonwealth? The nearer we can approach to that system in professional schools the better. Then will the student seek the college, and not the college the student. Then, and not till then, will pecuniary temptations be removed from the instructor's thoughts. By liberal endowments and liberal salaries, men of ability, who live to teach, can afford to do so without loss. How is it in other callings? Where is the classical college, the theological school, the law school, the polytechnic, the scientific, dependent upon fees for continued existence? There may be such, but they are the exceptions, or are just commencing, and resting in assurance that funds are sure to come in time. The community educates its ministers, its lawyers, its scientists, and men of liberal culture, for its honor and its wealth, but where its *health* is concerned, how great the

contrast! Few medical schools are endowed; hardly any, I think, but those connected with universities, and then these are the poorest of the departments. I have never understood the short-sightedness of the community, which made it so utterly regardless of the means for training and qualifying those to whom it commits "the issues of life and death." It would be thought that other departments of study would pale before this, without which they are valueless. "*Mens sana in corpore sano*" is accepted intellectually but not practically. I know of but one medical school in the country— there may be more—where the instructors have liberal salaries, entirely independent of the number of students or graduates, and have nothing to do with the management of the finances.

This school, the past year, was eight thousand dollars behind hand, which deficiency had to be supplied from the general fund of the university. The beneficent results of the change from the old system have more than justified the hopes of all concerned. I hope the day is not far distant when our dental colleges will be placed on a sure foundation, above dependence upon the fees of students.

II. Dental schools should be connected with well-furnished medical schools.

It is, in some sections, acknowledged by the medical profession that our calling is as much one of the specialties of general medicine as is otology, ophthalmology, and other specialties. What ridicule would be cast at a special school for these specialties! I trust that in a few years the same will be true of our specialty. Your committee, in their report two years ago, (Nashville Meeting, page 152) said: "There is no doubt, however, that general anatomy, physiology, pathology, and chemistry should be the fundamental studies of the dental student, and that these should be thoroughly mastered by him." We add that these can only be thoroughly taught in a well furnished medical school. The expense is too great for apparatus, models, and qualified

instructors, for any of our dental colleges to bear alone. But even if this were not true, why waste so much money and labor where it can be saved? In illustration: I know of one of our old and popular dental colleges, where, in their course of anatomy last winter, not a single student dissected, nor were the lectures illustrated by a single cadaver—charts and the manakin were the only means of demonstration. And this college is but a few streets distant from one of the oldest and most respectable medical colleges in the country. I am not repeating hear-say, but the statements made to me upon the spot by several of its students. Is this proper insruction for a student of a specialty of medicine? I do not see what objection any earnest well-wisher of dental education or worker in dental instructions can have to such an alliance. I know it is advantageous to both branches of practice. I do not advocate the engrafting of dental chairs upon medical schools under their government, but rather a consolidation or combination, so that there shall be two separate faculties of instructon and government, in which the medical instructors shall be members of each faculty, and a separate course of lectures upon such subjects saved. It costs no more in medicine to instruct two hundred than one. While the instruction must be more thorough and complete, the economical advantages should recommend it. Your committee are not indulging in speculations, but know whereof they affirm. I hazard the prophecy that five years hence we shall see such a system established in New York, Philadelphia, Baltimore and other cities. It has been already agitated there by some of their ablest dentists, and if the current sets that way those who oppose it will be carried down. Would that they who have worked so faithfully for dental education might head the movement, and still keep the supremacy. Then will professional education be far more successful in elevating the profession than ever in the past! Then will our noble profession rise to a still higher level in comparison with other liberal callings.

III. Two courses of instruction should be required of all students.

The medical profession is the father of the custom of reckoning a certain number of years of practice as equivalent to a first course of lectures. They saw the folly of such a course years ago, and abandoned it. As far as I know, it is entirely absolute with them to-day. In the growth of dental education such a course may have been necessary. In my opinion that age has passed, and long since passed. It has been the greatest incubus upon progress, which dental education has of late years had to bear. Its effect has been to give to young students an inducement *not* to commence their practice properly by a thorough course of study, but to wait for the promised reward for staying away, till their five years' practice enabled them to graduate after four months' study. Is it judicious to place before the young student such a bribe? Will his conceptions of the qualifications necessary for respectable practice be heightened thereby, or will it rather have an opposite and depressing effect? This provision was made for old practitioners in the early days, to enlist them in the cause. It is now no longer necessary to keep upon the statutes a law which has outlived and outgrown its necessity. Our efforts, so far as education goes, should be directed to the young. Surely they do not need this privilege. I think the time has come for this association to express itself in unmistakeable language upon this subject.

IV. The term of college study should be lengthened. This may be accomplished by extending the winter course, or by appending to it a summer course. Several colleges have tried the latter with success. It has many advantages. There is danger of crowding too much into the four months of the regular course, and, as a result, slighting either the theoretical or practical branches of instruction. I believe that two courses of eight months each is no more than is requisite for the average student. While it is probably im-

possible at present to enforce such a change, the college should give students who desire it, extra facilities by a supplemental course. This would, to a considerable extent, or entirely, take the place of office instruction, which too frequently is of little value to the student, confined as he is in the main to laboratory experience.

V. There is need of a more strict and uniform rule to govern the conferring of degrees. To what extent the practice of buying and selling of diplomas has obtained I cannot state. One of the most notorious institutions of this kind, which sold any desired degree for no qualification whatever but money, the Penn University of Philadelphia, has recently had its charter repealed by the Legislature of Pennsylvania.

I do not know how many dentists have patronized this institution, but I have been informed that there are some who occupy professorships in dental colleges, whose degree of M. D. was obtained from this source for money. I am happy to believe such cases are exceptional, and yet if professors will buy and use such a degree, what guarantee have we that they will not introduce a similar custom into the dental college under their government. In fact I have been informed that men have recently received the dental degree who have never attended a single lecture at the institution from which they received it. I trust this is not true, but as each college is a law in itself, no one can deny but that it may happen. In this I do not refer to honorary degrees, nor to any public system of conferring degrees, after an examination, upon men who have been long in practice; which custom, however we may question its expediency, is creditable, in that it is open and above board.

Your committee are of the opinion that general rules should be adopted, setting forth what length of actual attendance upon college exercises, and what qualifications for admission and graduation should be required of students.

They would recommend that you instruct their successors to investigate this subject, and report at the next meeting what action the association can take to secure an improvement for the future.

In conclusion, I trust I may hope that in thus advocating a higher education and broader culture, I may escape any charge of special pleading. I have entertained these views for years, and if I have been successful in contributing to the shaping of any institution so as to embody them, I can see in that no reason why I should now change them, nor fail to urge them with what ability I may possess, when my duty as your committee-man calls upon me to speak. These views may be considered radical, and in advance of the times, but if they are founded upon truth, they will stand, and be eventually adopted. If it is in the province of this Association to adopt a code of ethics, and make the endorsement of the code a prerequisite to representation in the Association, it cannot be beyond their province to take cognizance of professional education, and specify what rules and principles colleges shall adopt, especially if they wish to be represented in the Association. The colleges are not above the profession, and only so far as they act in accordance with its judgment and its claims, can they command its respect and support.

DISCUSSIONS.

DENTAL EDUCATION.

DR. ATKINSON—Novices are profuse in suggesting modes of procedure. Those who are older would like to arrive at a final success. We can arrive at nothing definite without due attention to the laws of mental philosophy. If we are to live in the past, and do as the past has done, then we must do as the men of the past did, endorse inferiority. I have announced myself as against the conferring of degrees. The diploma is a lie. And now, as to Colleges being above the profession, you might just as well say that the books of the past are equal to the workers of the present. What is now our weakness is that the memories of past conditions have taken possession of us, and we are content to dwell in the shades of darkness for ever. Now I endorse the idea of elevating the standard, but I recoil with horror from the plan proposed, which is retrograde in its tendency. The weakness of all the schools, the resting in formulas which they propose for the student to learn by a sort of mechanical memorizing which retards the development of the intellect. You can only learn through your own experience. The most brilliant examples of those who pass examinations for admission into the practice are those who have worked faithfully themselves in the practical operations of the profession. Now let us not be subservient to the errors which have kept others down. I hold that living investigators are the best guides to follow. They alone are *teachers.* Shall we then bind ourselves down to books and wade

through all the barren verbiage which lacks the earnestness of truth, and finally fizzes out into nothingness. Do not tell the learners that they cannot be anybody, and that book knowledge is the only knowledge. I tell you there is no knowledge until you come within the domain of psychology —the inner consciousness. It is this which you must apply to facts, that you may get knowledge. We might, without injury to the profession, shut up the schools with their *manikins*, and all the other *kins*—the devil and all. The individual should be used up for the benefit of the whole, you should be willing to give up your theories when truth is presented to you, and when a teacher transcends you, under inspiration, try him in those things that you can understand, and if you find him of the truth, then trust him in those other and higher fields of thought and investigation upon which the divine radiance of inspiration rests. Were you fully awake to your position and your interests, you would soon have a funeral of all the Colleges, and of all the books, except the bible and dictionary. I mean exactly what I say.

PROF. TRUMAN—It strikes me that though members are very willing to criticise the colleges, none are willing to put their hands to the work. It is well known that the labors of gentlemen engaged in teaching, are excedingly onerous, and it comes hard that we have to be criticised for what we cannot help. The colleges must be self-sustaining. We have no fund to go upon. Every dollar has to come out of our own pockets, and when we do as well as we can under such circumstances, I do not think we should be criticised so severely. And indeed I think the dental profession, under its present educational advantages, is fully up to the medical, so that there is not so much cause for dissatisfaction after all. I do not believe it is true, as stated in the paper, that some colleges do not have dissections. I can speak for my own at any rate. Now, you can have just the kind of education you want, if you sustain one

college and give it money. This is all that stands in the way.

I am not so much opposed to graduating men on one course who have been five years in the practice. I think they are much better qualified for graduation than those who have simply completed two college courses. In my opinion the course of instruction should be four years, and if we had a government to sustain us, as they have in Europe, we could have it just as we wished. Until then, I believe we cannot do better than go on as we are doing at present.

DR. MCQUILLEN—The Chairman of the Committee on Dental Education having twice declined to name the institution alluded to in the report, in which he said there were no dissections, it was but proper to state that the remark did not apply to the Philadelphia Dental College, as subjects were dissected there both winter and summer, by the professor of anatomy, and the most ample opportunities were afforded by this means, and the use of the manikin, for thorough demonstration.

He did not object to the criticism of dental colleges, for defects should be pointed out and wrong-doing exposed; but this ought to be done in a fair, open manner, rather than in a covert way, or by inuendoes, leaving persons in doubt as to what institution was meant. A course such as that was calculated to awaken antagonisms and jealousies, where there should be harmonious co-operation in the advancement of the cause of education. He thought, as a rule, private preceptors were more to blame than the professors; for where one student goes to college and graduates, ten enter upon practice from the laboratory or office of a preceptor, after having served as errand-boys, workmen at the bench, or assistants at the chair in malleting for a year or two. How many practitioners inquire into the moral, mental, or physical qualifications of those applying to them to enter the profession, or afford the students,

(so-called), the advantages of a well-selected library, direct their course of reading, and make periodical examinations to ascertain the progress made? As a general thing, when books are furnished, are not old and discarded text-books placed in the hands of the students to read at random, without guidance or encouragement? There are honorable exceptions to this: private preceptors who do their duty to the fullest extent, and who will not take students until they have obtained from them a positive promise to pursue a regular course of study, attend college and graduate, before entering upon practice. Until that course became the rule rather than the exception, the general education of the profession could not be looked for. He did not stand forth as the champion of any one institution (or wish to secure success by endeavoring to underrate others,) but for the interests of dental education at large. With respect to the allusion made in the report to the establishment of a dental department in the University of Pennsylvania, such a movement would meet with no opposition on his part, but, on the contrary, good will and sympathy, confident that those taking it in charge, would have no other interests at heart than to advance the cause of education. When Harvard University decided to establish a dental school, the members of the faculty had found him ready and willing, on being consulted, to afford every information gained from a hard-earned experience of years, to aid in organizing the institution.

DR. ATKINSON—When I said what I did concerning the colleges, I did not mean that they were a curse *per se*, but that if there were no colleges at all, we could concoct better plans for elevating the standard of education.

DR. MILLS—I think I can say, without egotism, that I have demonstrated my interest in the elevation of the profession, and I know something of opposition in this regard. The testimony of professors will bear me out as consistent here. I take the ground of Dr. Shepard, for the most part,

in his report. I think, however, that there are some men who are too strenuous in their efforts to find out who are doctors and who are not. For my part, I do not care what I am called, provided I am called *an honest man.* I agree with Dr. McQuillen, especially upon the point of sending students to the colleges. I could severely criticise the manner in which some have been prepared for college. So far as I am concerned, I think I stand on record as having done my whole duty in this regard. I am sorry to say that in my own city I stand alone. I have known preceptors to require their students to enter at the back door, and to shut them out from the office entirely. I have known them to be compelled, between the hours of work, to run over to a barber's shop to make a few dimes, and then come back to their labor, without one single word of instruction. Now if this system is worth anything at all, it requires stronger exertion on our part. There is too much shifting of responsibility. If we would have students properly prepared up to the colleges, we would soon elevate the profession. If, as our honored friend, Dr. Atkinson says, we have been *snake-bit* with a desire to learn ourselves, we would be more *apt to teach.* I am sorry that colleges receive students so poorly prepared, and more so, that some receive them without any private pupilage at all.

Dr. Jack—It is my desire that an investigation shall be set on foot, to find out those colleges which have been guilty of issuing bogus diplomas, and dealing summarily with them.

Dr. Dickernan—In regard to dissections, I would say that my college has carried its dissections and vivisections so far, as to have occasionally a visitation from the Society for the Prevention of Cruelty to Animals. I am in favor of having dental colleges established in connection with universities; but I am decidedly opposed to being a tail for a medical faculty to wag.

Dr. Buckingham—Since the discussion has taken a per-

sonal turn, I, as executive officer of my college, deny that any have been sent out from our institution whom we did not believe to be thoroughly prepared to receive their diplomas. I defy criticism upon this point. Our conditions are published, and we adhere strictly to them. If, however, Dr. Shepard were to come to me for graduation, do you suppose that I would submit him to an examination? We have, in this manner, conferred degrees without examination, where we were perfectly satisfied of the qualifications of the applicant. We have, also, occasionally conferred honorary degrees upon those who have been twenty years in the practice, and who have demonstrated their proficiency. We demand that other colleges do as we do, in the matter of publishing conditions. A great deal of fault is found with the kind of education which the students receive. Now we don't profess to teach spiritualism, but dentistry; and we don't profess to be under inspiration, but just simply to do our best to prepare men for the practice of dentistry.

Dr. Abbott — I have no particular fault to find with other institutions. I have no doubt but that the faculties of all our colleges are sometimes deceived as to the qualifications of men who come up for graduation. As to the graduating of men without reference to their qualifications, that has been carried on, I presume, to a limited extent. I have heard it said, however, that every college in the country, with two exceptions, made a practice every year of conferring the degree of D. D. S., honorarily, upon all who made application. As far as our college is concerned, it has never conferred that degree upon anyone who has not fulfilled to the letter our requisites for graduation, as published in our annual announcement. I presume each one of you have received that announcement, and know what those requirements are.

The idea advanced by Dr. Shepard, of keeping the college open during the summer, I know to be a good one, for our

institution has never been closed since the fall of 1865, when it first opened. By this means, we find that students get much more practical knowledge than they possibly otherwise could. We have, during the summer, from ten to twenty students in attendance. While it affords such excellent opportunities for students, it is also a great charity to the poor of our city, who take advantage of the gratuitous operations and keep us supplied with patients.

We do receive students who have not had private preceptors, because we believe they can be better taught in the college than in an office.

Every one of you know the effects of being shown how to do a thing. I have seen men who have been in the infirmary six months who were better operators by far than those who have been in a private office six years. I have, on many occasions, had an opportunity of verifying this by personal observations. You do not stand over a student and tell him and show him *how to do.* That is just what we do in colleges, and is why we succeed so much better than private preceptors.

Our institution is prepared to take any advanced position this Association may choose to recommend, and will go just as far as any other college in endeavouring to elevate the standard of education, and of the profession generally. I understand that the Harvard school has discontinued the allowance of five years' practice, as equivalent to one course of lectures, and require all who come up for examination to have attended two courses of lectures. This, perhaps, is a step in advance, but we should remember that not time but qualifications should determine the standing of a student. Some men, as you are all aware, learn more in six months than others can in as many years.

Dr. Judd—I have been exceedingly gratified with the discussion which has been going on. All parties seem to look at the subject before them coolly, and to be willing to adopt the best possible means of instruction. The gentle-

man who first spoke on this subject (Dr. Atkinson) stated that the students educated in the colleges had to unlearn what they had been taught when they went into practice. Now I don't believe that at all, and I must insist that he confine himself strictly to those with which he is best acquainted, for this is certainly not true in all cases. The faculties of the colleges are honestly at work to make practical men of the students committed to their care. The students are not taught to memorize, but they are required to use their judgment and exercise their own powers of thought. Dr. Truman said that he believed the dental profession stood on an equality with the medical. Now this would be very strange if it were true—that a profession of only fifty years should be equal to one three thousand years of age.

The students in dental colleges are as good as those in medical, for I have the opportunity of seeing them together, and I think they are equal in every respect; but this does not justify such a sweeping remark as that to which I have referred. In regard to the explanations which have been made by the representatives of the separate schools, I think it unnecessary for me to say anything in reference to my own, as I would not have accepted a report as a member of the committee, which I was not for my own part, and in the name of my school, willing to endorse. And now one more point—the status of the schools. Who is responsible for the manner in which the educational interests are carried on? The onus of sustaining the schools rests upon the profession generally. A certain amount of responsibility rests upon every member of it. Now there are differences in dental schools, strange if there were not; and it is the duty of the profession to rally around those which it considers the best worthy of their support. If you wish to elevate the standard, it is the duty of the profession to do it by encouraging those schools which offer the best educational advantages. There is another condition which is opposed to progress—the partisanship which has taken hold upon us. Our interests should be mutual and not sectional.

DR. MCQUILLEN—I simply wish to state that the list of our graduates is published annually, and a *caveat* is entered against the recognition of diplomas issued by colleges in Philadelphia, not properly signed. The two colleges which have issued bogus diplomas have been blotted out by the authority of the State.

DR. WYMAN wished to state that Dr. Mills was not the only one in Brooklyn who was laboring to elevate the profession, as he, himself, was working as earnestly and effectively as he could in this direction.

REPORT
ON
ÆTIOLOGY.

BY G. R. THOMAS.

THE causes that give rise to the variety of diseases that the teeth of the civilized human race are subjet to, are of the greatest importance to the dental practitioner. In fact, there can be no intelligent practice without a knowledge of them.

In this short and imperfect paper, I do not intend to enter into the ætiology of all the diseases the teeth suffer from, but to speak only of caries, for this is the first great evil with which we have to contend. It is not enough that we know how to arrest the progress of decay. We ought rather, by constant research, to be able to prevent its first invasion.

Are we not, as a profession, developing our operative, mechanical faculties, at the expense of that philosophical research after the *cause* or *causes* which make this great army of dental artists a necessity. I believe the time will come, not when every physician shall be a dentist, but when every dentist shall be a physician; or in other words, that he shall have a thorough knowledge of all that pertains to the prevention of disease, and that he shall not be deemed qualified for the practice of his profession until he has acquired that knowledge. We have been wont to look upon the ignorance and stupidity of that multitudinous throng—the Japanese—as only equaled by barbarous nations. But

they have some practices that I believe might well afford a lesson to more civilized nations. Prominent among which, is this: A man is not allowed to practice medicine until he has passed a satisfactory examination; and then he is given a charge over a certain number of people, or a certain district. His salary is fixed by law; and so long as those under his charge are in health, it remains the same. But as soon as sickness enters his flock, a certain amount is withdrawn. It is true, this practice may be met with objections, but it certainly has this commendable feature—that a physician so restricted, would make use of every available means to prevent disease. And is not this the one thing needful with us, to be able to prevent the first appearance of decay? I believe much can be done in this direction.

We have been told long ago, by eminent French, English and German writers, that the caries of bone and of teeth were identical, and that the latter was due to inflammation of the dentinal structure. But these theories have long ago been exploded.

I believe our good old brother, Eliazar Parmly, who still lives, first struck the key note in this country, some fifty years ago, by distinctly promulgating the doctrine, that decay of the teeth was the result of the action of external corrosive agents. Now if this be true, and I believe it is, should it not be our first aim, as dental practitioners, to learn to detect, not only the existence of these corrosive agents, but their chemical difference and the various sources from which they come? Then, and not till then, shall we have our feet upon the rock, and be ready to go forward. I believe that if we can thus go forward, we shall, after a time, be able to rejoice with those who, instead of being obliged to present teeth that groan under the weight of the precious metal, will be the happy possessors of those priceless gems of nature's own setting unmutilated. But, says one, how is this to be brought about, in the face of so many formidable obstacles that we have to contend with. Who, I ask, are the ones

to put their shoulders to the wheel and commence the removal of these obstacles, if it be not the operators themselves? Is there one here that does not know that his patients are moulded in his hands, like the clay in the hands of the potter? No! says one; we must take teeth as we find them. True; but we must manage to find them at the beginning; and if we fail to reap, we can sow, that others may reap the fruit of our sowing.

There is probably no way by which we can make ourselves more useful, than by educating the coming generation through the parent of to-day. We should never allow parents to go from our hands without cautioning them in relation to the teeth of their children, and *insist* upon it, that they put them *early* under the charge of some good reliable dentist. We are often too indifferent in this respect, or too modest, perhaps I should say.

But to come more directly to the object of this paper, I think I cannot do so more successfully than to call your attention for a moment to (what most if not all of you have already seen, however,) a few words that have lately fallen from the lips of our eminent brother, Dr. Watt, of Cincinnati viz.:

"If we can take the child, and, by some process, see that these various acids, as they make their appearance, are completely neutralized and kept so, that the teeth, when they make their appearance shall be as regular as nature has intended, and that the habits of the child, in the care of them, shall be as cleanly as the most fastidious could desire, they will not decay, thereby allowing us to turn our gold over to commerce and our pluggers to pruning hooks."

But I hear some one ask, "What are you going to do with all these other recognized causes that excite decay, such as an innutritious diet on the part of the mother during pregnancy, and continued on the part of the child during the growth of the teeth, thereby producing organs with insufficient strength to resist the action of mastication; sudden

and extreme changes of temperature, living in unfavorable localities (such as malarious and miasmatic regions), imperfect dental operations of various kinds, etc." True enough, but may not all these, except the first, (and I am not so sure but that may) be adjunct causes, or consequent causes upon the existence of the acids above referred to?

It may be urged by some that the saliva (being alkaline in its normal condition) neutralizes the action of these acids. So it may, to a greater or less degree in many cases, but do we not believe there are many in which it does not, and can we justify a conscientious belief more creditably than by that unremitting research that shall develop either the fallacy or the truth of the matter under consideration? For if it be true in the least, it is alarmingly so, and as the constant falling of the water upon the hardest rock will wear away its apparently unyielding surface, (as proof of which, this, the greatest of nature's wonders attests), so the uninterrupted presence of any of the acids referred to will destroy the hardest bones of nature's production. I have thus far aimed at but this one point in dental ætiology, and if I have succeeded in awakening any interest that shall be followed by an exhaustive discussion, my object has been accomplished.

REPORT OF COMMITTEE

ON

DENTAL APPLIANCES.

MR. PRESIDENT.—The committee whose duty it was to prepare the report on Dental Appliances, owing to the changes incident to the adoption of the new constitution, find it impossible to make a report creditable to the committee, profitable to the Association, or that will do justice to exhibitors. Not until the adjournment of the Association had the change above referred to, come to our knowledge, whereby the committee of arrangements, by virtue of such appointment, becomes also the committee on appliances. The committee of arrangements, during the session, acted only in that capacity, supposing, without a doubt, that as heretofore another committee had the matter of appliances in charge, not knowing to the contrary until all opportunities had passed for obtaining information, respecting the various articles on exhibition, or the names of those interested therein. However, we feel that a general notice should be taken of the many valuable adjuncts to the operating apartment in dentistry.

Your committee regret exceedingly that circumstances were such as to hinder the appearance of such a report as the various articles of interest on exhibition would have called for.

Of the instruments and appliances, we can only mention a few by name, without an attempt to associate the same with the exhibitor or manufacturer. In a few cases we

could do this, still the effect would have more the appearance of favoritism to those mentioned than of justice to the neglected, while the latter, perhaps, could claim equal merit. The interest manifested in dental engines, the number of kinds on exhibition, and the efficiency of their operations during clinics, establishes their practicability. As for the power to drive them, "you pays your money and takes your choice." Air, electro-magnetism, and foot-power, each have merit, and all are more or less practicable. Much effort is being put forth to utilize battery power through the magnet for other operations connected with dentistry, and not without success. Automatic pluggers, as well as burring engines, also dental fans, calculated to add comfort to operator and patient, were successfully operated by this power, transmitted through elastic wires. Gold foil for filling teeth, which thus far has held its rank as a standard article, has a fair show for rivalry, perhaps not so much in the foil, as in the form in which it will be used or purchased ready for introduction into the cavity. Much valuable time, and not a little gold, is now lost in preparing the gold from foil, ready for use. The specimens of various preparations from foil plainly show that all that is required by manufacturers is a demand for any given preparation, be it cylinder of greater or less density—blocks or pellets, soft or cohesive, and it can and will soon be provided—such, at least, are the signs of promise.

Mack's method of securing fillings and tooth crowns, by retaining screws, is well worth the attention of dentists. In the department of anæsthetics, there was little to command attention. There was, however, a very pretty portable apparatus, containing about one hundred galls. of liquid nitrous oxide gas, said to be equivalent to twice that quantity as ordinarily used. The apparatus certainly must be convenient for use, away from the office or place where gas is manufactured.

In the mechanical department we noticed an invention applied as an air chamber, for retaining plates of teeth. We doubt not its efficiency for that purpose; its convenience and effects upon the membrane covered thereby, we could only determine by its application and use. Strong claims were set up for coralline base, as a substitute for rubber and other cheap bases for artificial teeth. One of the claims for this article (which somewhat resembles the celluloid) is its close resemblance to the natural gum, thereby enabling the use of plain teeth in all cases.

With equally good intentions for parties and articles not noticed in this report as for those mentioned, we most respectfully submit the above.

S. B. PALMER,
G. B. McDONNELD,
COMMITTEE.

REPORT

ON

MECHANICAL DENTISTRY.

BY J. ALLEN.

Your committee, to whom was referred the subject of mechanical dentistry, beg leave to submit the following report.

In artificial dentistry we have nothing new to present, with the exception of the method of constructing pyroxyline or soluble cotton plates, a specimen of which we have here made by Dr. Spooner, of New York.

This method consists in mounting the teeth upon a narrow plate of gold or platinum, and then attaching the teeth thus mounted to a plate of pyroxyline.

Dr. Judd, of St. Louis, also handed us a case of vulcanized gutta-percha, prepared and vulcanized in a similar manner to rubber. Although not a new thing, it is thought by some not to be included in the Cumming's patent.

We would also call your attention to a new method of securing artificial dentures in the mouth, by what is called Gillespie's atmospheric attachment, consisting of a disc of soft rubber, attached to the upper or palatal surface of a plate, in such a manner that it adheres to the hard palate in the same way that the toy called a sucker adheres to a stone.

As the great object we have in view in these annual convocations is to elevate our profession as a whole, let us

not lose sight of one branch while advancing another, but let the departments be carried forward and developed equally, the one with the other.

Now it is very evident that of late this has not been done; for while the operative branch of our profession has been advanced within the last few years, artificial dentistry, with a few exceptions, has retrograded. The present status of this department is far below what it was twenty-five or thirty years ago.

In view of this fact we would recommend that this branch of dentistry receive more attention from the better class of dentists, who can, if they will, check this backward movement, and bring this department forward, so as to meet the demands of the present day; then the community at large will be better served, and dentists better paid for such services as they are now in the operative department.

Again—there should be no fixed price for sets of teeth, as the mechanic has for making washtubs or wheelbarrows, but let the compensation be based upon terms of equity, according to the amount of time, skill, and expense that may be necessary to meet the requirements of each particular case. Another suggestion is that when new devices are brought before the profession, whether for artificial dentistry, or other appliances for dental purposes, a name be given them which is comprehensive, or, in other words, let things be called by their right names. One more suggestion is this—that in arranging the order of business for our annual meetings, let artificial dentistry be placed higher on the list of subjects brought before the association, that it may be reached earlier in the session, and thus give more time to dwell upon this subject.

DISCUSSIONS.

DENTAL LITERATURE.

DR. CROUSE—There are a few points to which I would call your attention. I should like to lessen the number of dental journals first, because they do not all contain original matter enough; and secondly, there are not writers enough to supply them. We pay for every journal, and then we read from one what has been quoted from another. I would, therefore, recommend a concentration of force on a few. One or two journals would be sufficient. Again. I don't think the journals this year are as good as they have been—the reason of this I do not know.

DR. BUCKINGHAM—The journals have been doing all in their power to get articles. It is very hard to keep up a journal without money. We are looking in all directions for communications, and asking the profession to send us something useful. The fault lies with the dentists, not with the journals. It will also be remarked, that of all the journals published, not one is separated from an Institution, and they are only kept up as organs of the schools to which they are attached. This militates against their usefulness. I am connected with one of these journals, though not the editor.

DR. MCDONNELD—Competition is the life of the journals. It is a bad policy to reduce the number.

DR. CROUSE—I simply advocated the condensation of the number, because we were paying for what we did not get.

DR. BUCKINGHAM—Let Dr. Crouse start one then. I understand since I was on the floor, that there is one journal in Canada that is not connected with any college; but it does not pay to publish them unless it is done in the interest of some Institution.

DISCUSSIONS.

DENTAL HISTOLOGY.*

PROF. JUDD—This is an interesting study. We have more to hope from this than from anything else. In the paper which I read, I described all the parasites that are known to be the cause of disease. We have not found the connection between many of these and the diseases consequent upon them. There are very few healthy mouths in which the *leptothrix buccalis* is not found, which, however, does not prove that it is not a very active agent in producing disease. *Bacteria* and *spiralia* are not so readily discovered. Five hundred diameters is sufficient for many of these parasites, but it is necessary to have one thousand for bacteria. Few of our objectives magnify over five hundred diameters. I would call attention to the brachioni, beautiul specimens of which can be obtained from water that has been standing for several days. They have a caudate, or rather, I should say, a caudiform appendage. This has been demonstrated to be a foot with a small catch, by which it takes hold of a surface and retracts itself with the greatest possible velocity. Watching the motions of one of these, I noticed, after it had performed this feat nearly twenty times, that it tore off its foot completely. I simply call attention to this, because it shows what a great degree of activity these little things possess.

PROF. TAFT—There are but few in the profession who pursue this line of investigation. Every dentist should be a scientific man and avail himself as much as possible of

* The Committee has not been able to obtain the report upon this subject.

every opportunity, to carry on investigations. Every one ought to be engaged in investigations like these. We would then go on from point to point, continually accumulating knowledge as we have done to-day. Every dentist should have a microscope and use it. Good ones are now very cheap, and no one should rest satisfied until he has procured one; and he should not stop here, but go on accumulating more apparatus and enlarging his field of investigation. Everybody should go to work. One man may push his investigations and find out things that others have overlooked. A very good microscope is one made by Stoddard, of Boston, and sold for twelve dollars. It has a tube seven or eight inches long, and is capable of fine adjustment. I have used with it, my fifteenth and even thirtieth. It will answer all the purposes of ordinary investigations.

MISCELLANEOUS DISCUSSIONS.

FOURTH DAY—EVENING SESSION.

PROF. TAFT offered a resolution to go forth as the sense of the association upon the use of anæsthetics.* He supported them by saying that he had taken patients to those who claim to make pure gas, and very bad results had followed the administration. One young lady, by inhaling it, was made very sick. Her bronchii were inflamed and sore for a long time, requiring her to go to bed, and know of cases where death has occurred. An ordinary operation does not warrant the use of anæsthetics. Empiricism grows out of it. Men travel through the country administering it, and claim the sanction of this Association or its use. Such a pronunciation as this recommended in the resolution from this body would set us right before the world.

DR. DUTCH thought the great difficulty in the way of administering anæsthetics was the total ignorance of the parties administering it. He mentioned a case where he had refused to be a party to its administration. He endorsed the resolution heartily.

PROF. TAFT brought before the association the subject of local societies. He thought the State societies should be made up from local societies, and the national association from the State societies. He had, during the past year, visited twenty meetings of the local societies, and did not find them as flourishing as he would like them to be. He thought that the national association did not take

* See page 32.

sufficient interest in the local societies throughout the country. The Association, he thought, did not come up to the expectation of the local societies. The good which could be done by taking the proper interest in these societies would fully compensate for the time and labor devoted to it. He recommended the appointment of a committee to adopt some method of procedure in this direction. Calls are continually made for prominent members of the Association to meet with the societies and give them instruction. This ought to be done. By this means they would be both educated and stimulated. Societies had done much towards elevating and advancing the profession, and much more was capable of being done through this agency. He thought an influence should go out from this Association through every society in the land, and that active measures should be adopted for fostering these interests.

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